

LISTING OF BINDER CONTENTS (REVERSE ORDER)

F-23-R-1 I AND II

F-23-R-2 I, II, AND III

F-23-R-3 I AND II
III

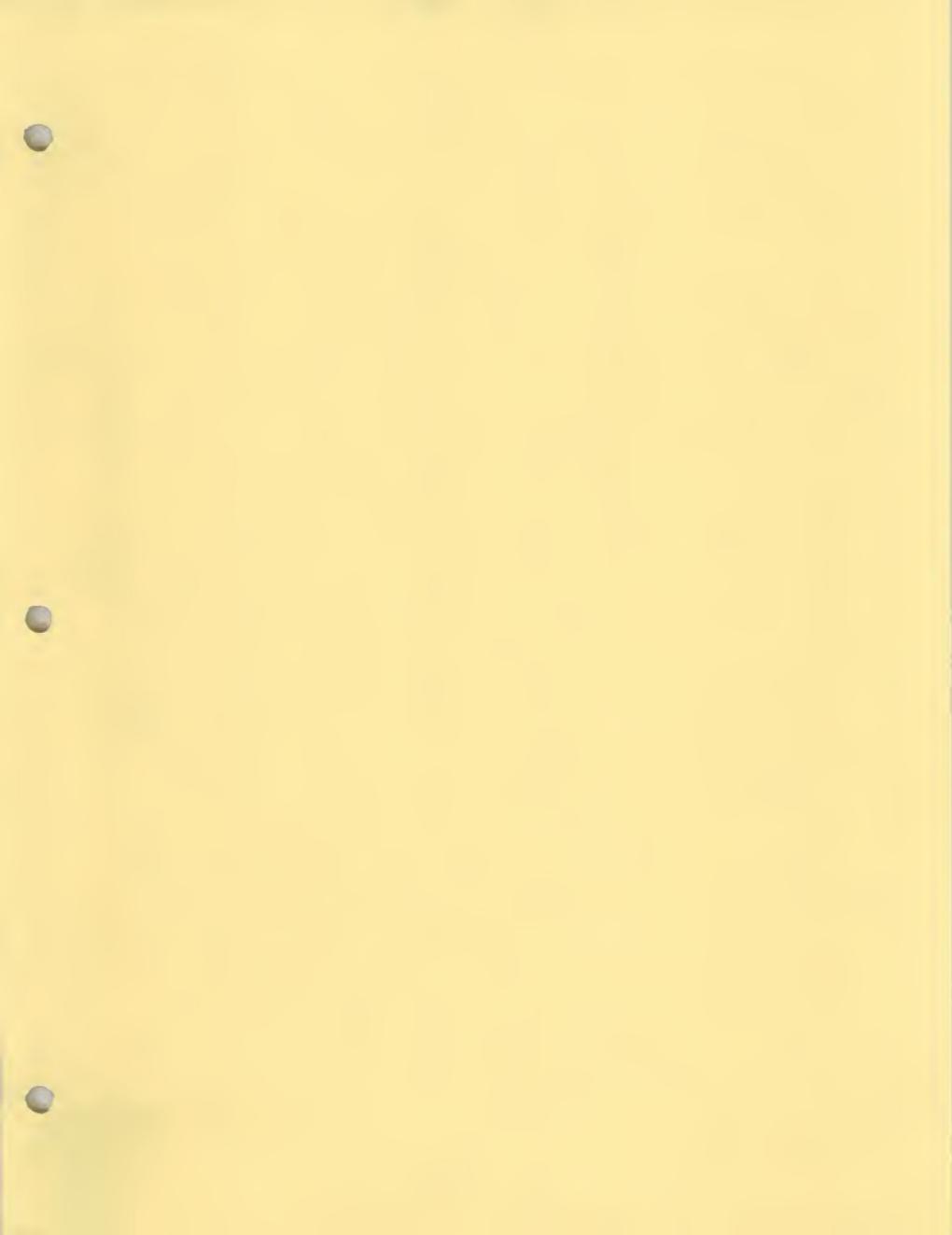
F-23-R-4 I AND II
III

F-23-R-5 I AND II

F-23-R-6 I AND II

F-23-R-7 I AND II
III







MONTANA FISH AND GAME DEPARTMENT
FISHERIES DIVISION

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT

State of Montana

Project No. F-23-R-7

Name Fisheries Investigations Laboratory

Job No. III

Title Stream Habitat Evaluation

No work was done for this project during the report period. It is recommended that segments of this work be done by the Cooperative Fisheries Unit at Montana State College.

Prepared by John C. Peters

Date December 10, 1964

Approved by George D. Hutton







MONTANA FISH AND GAME DEPARTMENT
FISHERIES DIVISION
HELENA, MONTANA

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT

State of Montana

Name Fishery Investigation Laboratory

Project No. F-23-R-7

Title Age and Growth Studies and
Analysis of Bottom Samples
in Connection with Pollution
Studies

Job No. I & II

Period Covered July 1, 1963 to June 30, 1964

Abstract:

Over 6,000 scales were processed in the laboratory during the report period. Age and growth information from 21 individual waters are included in this report. No benthos work was done during the year.

Recommendations:

It is recommended that this project be terminated as a Federal Aid project. However, the compilation of statewide age and growth fish statistics will be supported under a state project.

Objectives:

In formulating a sound fisheries management program it is necessary to know the growth rates and age composition of fish populations throughout the state. This laboratory provides facilities for processing scale samples; determining age and growth rates from the scales; and maintaining files for the age and growth information. Periodically, the laboratory will compile an up-to-date summary of all the age and growth statistics so that management personnel will have a historical perspective to make biological judgements.

Techniques and Findings:

During 1963-64, 6,287 scales were received and mounted in the laboratory. The information from the scale envelopes was tabulated on data sheets. The mounted scales and data sheets were sent to the biologist who made the collection. After the scales are aged and calculated total lengths shown for each annulus, this information is returned to the laboratory age and growth file.

Lengths at each annulus were calculated with a nomograph, assuming a straight line relationship with the intercept at zero. Table 1 describes the mean calculated total length in inches at each annulus by species from each water within a major drainage. The code number is shown below each river or lake name.

TABLE I Age and growth of Montana fish. Average calculated total length, in inches are shown for each annulus. The number of fish is indicated by the number in parenthesis

SALMONIDE

Mountain Whitefish, Prosopium williamsoni

	Year Collected	I	II	III	IV	V	VI	VII	VIII	IX	X
MADISON DRAINAGE (Lakes)											
Cliff Lake 13-7360	1963	4.2 (4)	7.1 (4)	8.9 (1)							
MISSOURI DRAINAGE (Streams)											
Prickly Pear Creek 17-6016-1	1962	3.6 (6)	6.5 (5)	9.5 (5)	11.0 (3)	13.5 (1)	15.1 (1)				
Prickly Pear Creek 17-6016-1	1963	3.4 (6)	7.3 (5)	10.0 (4)	11.6 (3)	12.3 (2)	12.9 (1)	14.1 (1)	14.9 (1)		

Golden Trout, Salmo aquabonita

MADISON DRAINAGE (Lakes)											
Blue Paradise Lake 13-7020	1963	2.5 (3)	6.0 (3)	10.2 (1)	13.6 (1)						

TABLE I (continued)

Cutthroat Trout, Salmo clarki

Year Collected	I	II	III	IV	V	VI	VII	VIII	IX	X
BEAVERHEAD DRAINAGE (Lakes)										
Elk Lake 1963 1-8720-3	3.6 (1)	6.2 (1)	10.5 (1)	14.2 (1)	16.8 (1)	18.9 (1)				

MADISON DRAINAGE
(Lakes)

Lake Cameron 1963 13-7160-	3.2 (19)	6.8 (19)	9.4 (19)							
Finger Lake 1963 13-7620-	3.5 (10)	7.7 (9)	10.4 (3)							

Rainbow Trout, Salmo gairdneri

BEAVERHEAD
DRAINAGE
(Streams)

Blacktail Creek 1963 1-720-1	2.7 (45)	6.6 (20)	9.9 (13)	11.9 (4)						
Red Rock River 1963 1-6140-1	3.3 (10)	9.9 (8)	13.4 (6)	17.0 (1)						
Horse Prairie Creek 1963 1-3500-1	2.7 (11)	6.6 (2)	9.9 (1)							

BIG HOLE
DRAINAGE
(Lakes)

Browne's Lake 1963 2-7525-3	3.0 (13)	7.1 (10)	9.2 (5)							
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GALLATIN DRAINAGE
(Streams)

Spring Creek 1962 9-5700-1	3.2 (52)	7.2 (21)	11.4 (8)							
Jackson Creek 1963 (Rocky Creek) 9-2622-1	3.2 (46)	6.5 (5)	9.7 (2)							

TABLE I (continued)

-4-

Rainbow Trout, Salmo gairdneri

Year Collected	I	II	III	IV	V	VI	VII	VIII	IX	X
MADISON DRAINAGE (Lakes)										
Blue Paradise 1963 Lake - 13-7020	2.6 (6)	5.5 (6)	7.4 (4)	10.1 (4)	12.8 (4)	15.1 (4)	17.6 (2)			
Cliff Lake 1963 (wild) 13-7360-	2.7 (10)	6.7 (10)	9.7 (9)							
Cliff Lake 1963 (Hatch.) 13-7360-	6.7 (4)	9.6 (4)								
Craig Lake 1963 13-7500-	3.4 (22)	6.0 (20)	8.5 (12)	10.4 (4)						
Large Echo Lake 13-7820-	3.9 (4)	6.7 (3)	8.8 (3)	10.5 (3)	11.6 (1)					
Small Echo Lake 13-8420-	3.3 (32)	6.5 (30)	8.7 (21)	10.0 (13)	11.3 (1)					
MISSOURI DRAINAGE (Streams)										
Prickly Pear 1962 Creek 17-6016-1 <i>NEED</i>	2.8 (147)	5.5 (35)	8.5 (4)	12.7 (2)						
Prickly Pear 1963 Creek 17-6016-1 <i>NEED</i>	2.8 (82)	6.5 (26)	9.1 (7)	11.7 (3)						
BEAVERHEAD DRAINAGE (Streams)	Brown Trout, <u>Salmo trutta</u>									
Beaverhead River 1-500-1	4.3 (50)	10.0 (48)	13.1 (20)	14.9 (5)						
Grasshopper Creek 1-3100-1	4.1 (30)	8.9 (27)	12.2 (10)	13.1 (1)	15.4 (1)					

TABLE I (continued)

Brown Trout, Salmo trutta

Year Collected	I	II	III	IV	V	VI	VII	VIII	IX	X
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GALLATIN DRAINAGE
(Streams)

Spring Creek 1962 9-5700-1	4.4 (79)	10.6 (49)	13.3 (24)	15.9 (6)	20.3 (2)	20.6 (1)				
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MISSOURI DRAINAGE
(Streams)

Prickly Pear Creek 17-6016-1	3.0 (81)	7.1 (34)	11.7 (18)	14.6 (7)	16.5 (5)					
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Prickly Pear Creek 17-6016-1	3.1 (94)	7.7 (42)	11.3 (16)	13.4 (12)	16.3 (2)					
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YELLOWSTONE DRAINAGE
(Streams)

Sheilds River 1963 22-5362-1	2.7 (46)	6.2 (40)	10.1 (15)	13.4 (7)	14.4 (3)					
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Brook Trout, Salvelinus fontinalis

BEAVERHEAD DRAINAGE
(Lake)

Lower Branham 1963 Lake 1-8540-3	2.8 (25)	5.9 (21)	8.5 (2)							
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Reservoir Lake 1963 1-9380-5	3.6 (24)	6.2 (19)	8.4 (2)							
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Upper Branham 1963 Lake 1-8540-3	3.1 (13)	5.9 (12)	8.4 (5)	9.6 (2)						
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GALLATIN DRAINAGE
(Streams)

Spring Creek 1963 9-5700-1	4.0 (65)	7.4 (14)								
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BIG HOLE DRAINAGE
(Lakes)

Browne's Lake 1963 2-7525-3	2.8 (26)	5.5 (26)	7.6 (8)							
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TABLE I (continued)

Lake Trout, Salvelinus namaycush - continued

Year Collected	I	II	III	IV	V	VI	VII	VIII	IX	X
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BEAVERHEAD DRAINAGE
(Lakes)

Elk Lake 1963 2.5 4.8 7.3 10.7
1-8720-3 (3) (3) (1) (1)

CATOSTOMIDAE

Longnose Sucker, Catostomus catostomus

BEAVERHEAD DRAINAGE
(Streams)

Grasshopper Creek 1963 2.2 4.2 6.4 8.5 11.3 13.2
1-3100-1 (85) (52) (24) (8) (5) (1)

MISSOURI DRAINAGE
(Streams)

Prickly Pear Creek 1962 1.4 4.1 6.9 10.3 13.6
17-6016-1 (53) (44) (16) (5) (2)

Prickly Pear Creek 1963 1.3 3.3 5.5 8.1 10.9 13.3 14.8 15.6 16.7 17.1
17-6016-1 (55) (35) (20) (15) (12) (10) (9) (5) (3) (1)

White Sucker, Catostomus commersoni

BEAVERHEAD DRAINAGE
(Streams)

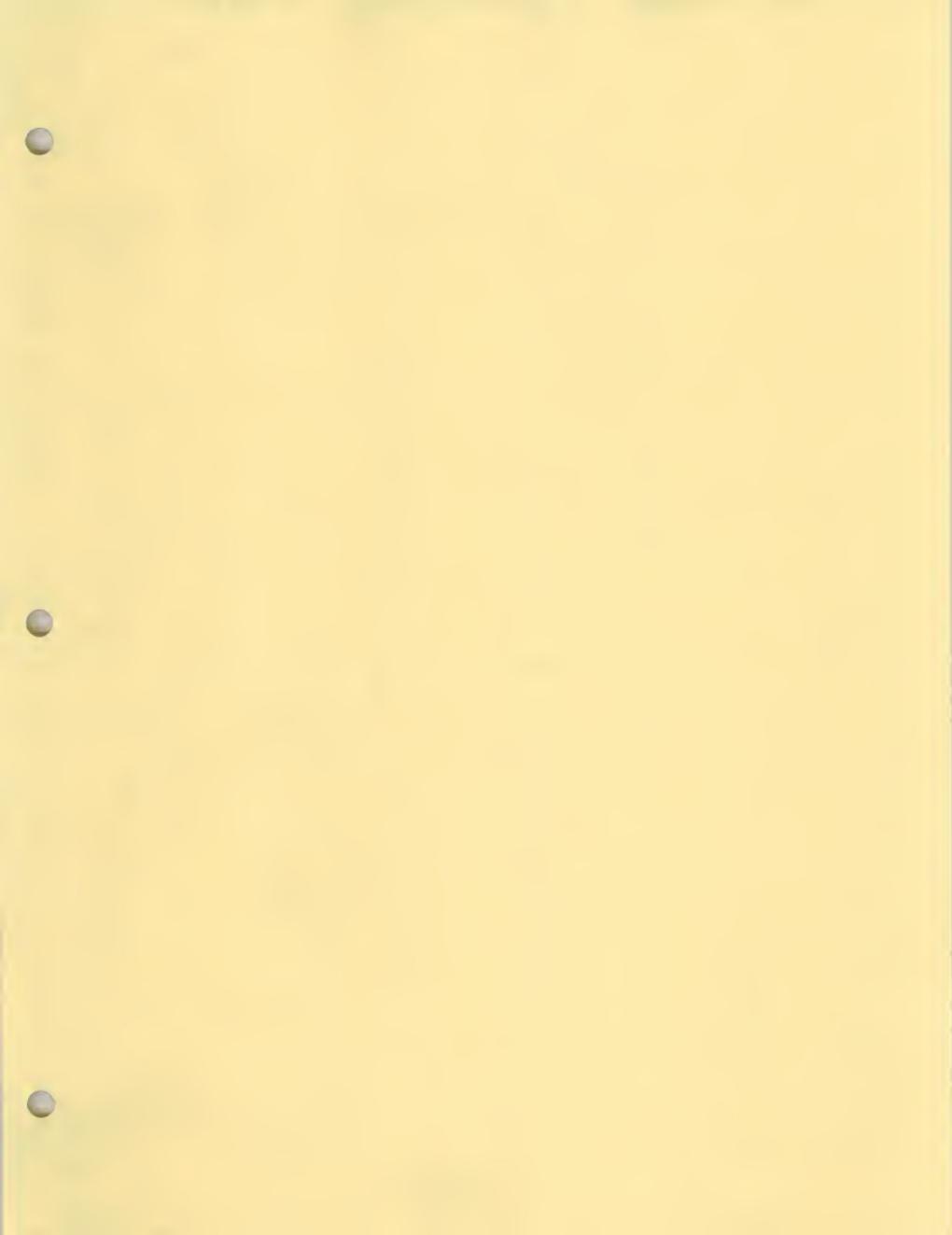
Grasshopper Creek 1963 2.5 5.0 7.5 10.0 11.2 12.4
1-3100-1 (55) (26) (14) (10) (4) (3)

MISSOURI DRAINAGE
(Streams)

Prickly Pear Creek 1962 1.1 2.7 4.9 8.1 10.1 11.5 12.9 13.5 14.9 15.5
17-6016-1 (14) (10) (8) (6) (4) (3) (3) (1) (1) (1)

Prickly Pear Creek 1963 1.0 3.0 6.2
17-6016-1 (6) (4) (1)

End of Report





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Age and growth studies and analysis of b

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MONTANA FISH AND GAME DEPARTMENT
FISHERIES DIVISION
HELENA, MONTANA

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT

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State of Montana Name Fishery Investigation Laboratory

Project No. F-23-R-6 Title Age and Growth Studies and Analysis of

Job No. I & II Bottom Samples in Connection with

Pollution Studies

Period Covered July 1, 1962 to June 30, 1963

Abstract:

Over 5,000 scales were processed in the laboratory during the report period. Summary tables, listing the age and growth records from 1948 through 1961, are included in this report. No benthos analysis work was done during the year.

Objectives:

In formulating a sound fisheries management program it is necessary to know the growth rates and age composition of fish populations throughout the state. This laboratory provides facilities for processing scale samples; determining age and growth rates from the scales; and maintaining files for the age and growth information. The laboratory is located at Montana State College and allows for utilization of trained student assistants in both scale work and analysis of bottom samples.

Techniques and Findings:

During 1962-63, over 5,000 scale samples were received and mounted in the laboratory. The information from the scale envelopes was tabulated on data sheets. The mounted scales and data sheets were sent to the biologist who made the collection. After the scales were read, the information is returned to the laboratory age and growth file.

A summary was compiled from age and growth records collected from 1948 through 1961 listing the species and individual waters within a major drainage. TABLE I describes the mean calculated total length in inches at each annulus by species from each water within a major drainage. TABLE II describes the mean calculated total length in inches at each annulus by species for: (1) all lakes; (2) all streams; and (3) the grand average for all waters. The term "lakes" includes all lacustrine waters. TABLE III lists the major drainage in the state.

Lengths at each annulus were calculated with a nomograph, assuming a straight line growth relationship with the intercept at zero. All the information in this report is on file at the Fisheries Laboratory, Montana State College, Bozeman. A bibliography is included in this report listing age and growth investigations in Montana.

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TABLE I. Age and growth of Montana fish. Average calculated total length, in inches, are shown for each annulus. The number of fish is indicated by the number in parenthesis.

SALMONIDAE

Lake Whitefish, Coregonus clupeaformis

Year Collected	I	II	III	IV	V	VI	VII	VIII
CLARKS FORK RIVER DRAINAGE (Lakes)								
- Noxon Rapids Reservoir 5-9328-5								
1961	7.0 (54)	10.9 (53)	14.0 (53)					
FLATHEAD RIVER DRAINAGE (Streams)								
- Swan River 7-4560-1	1961	3.9 (6)	7.8 (6)	11.4 (6)	13.1 (5)	14.6 (2)		
Mountain Whitefish, <u>Prosopium williamsoni</u>								
BIG HOLE RIVER DRAINAGE (Streams)								
- Big Hole River 2-475-1	1959	3.1 (34)	6.4 (31)	9.3 (27)	10.8 (23)	13.4 (6)	16.1 (1)	
- Big Hole River 2-475-1	1959	4.4 (19)	8.9 (19)	11.1 (14)	12.9 (2)			
- Steel Creek 2-5950-1	1959	3.1 (45)	6.7 (43)	9.6 (31)	11.5 (20)	13.2 (12)	14.8 (4)	15.4 (2)
- Trail Creek 2-6450-1	1959	3.1 (5)	6.3 (4)	9.2 (3)	10.5 (1)			
- Wise Creek 2-7025-1	1959	2.8 (7)	5.9 (7)	9.1 (7)	11.2 (7)	12.3 (2)		
BITTERROOT RIVER DRAINAGE (Lakes)								
Como Lake 3-7675-3	1958	3.7 (21)	7.9 (21)	10.2 (10)	11.9 (4)	13.6 (1)		



Mountain Whitefish, Prosopium williamseni cont.

	Year Collected	I	II	III	IV	V	VI	VII	VIII
BLACKFOOT RIVER DRAINAGE (Lakes)									
Alva Lake 4-6120-3	1948	4.1 (26)	8.2 (18)	10.3 (3)	12.3 (1)				
Alva Lake 4-6120-3	1954	3.8 (18)	8.1 (18)	10.4 (18)	11.5 (7)				
Alva Lake 4-6120-3	1955	3.9 (54)	7.8 (54)	9.7 (46)	10.7 (30)	11.7 (11)	13.1 (1)	14.0 (1)	
Inez Lake 4-6720-3	1954	3.6 (23)	7.4 (23)	9.5 (12)	9.5 (1)				
Inez Lake 4-6720-3	1955	3.6 (48)	7.1 (42)	9.0 (35)	9.9 (13)	11.5 (1)			
Inez Lake 4-6720-3	1961	3.5 (25)	6.6 (25)	8.7 (23)	10.0 (18)	10.8 (7)	11.1 (1)		
Placid Lake 4-7140-3	1948	3.7 (25)	7.0 (23)	9.3 (19)	10.3 (6)				
Placid Lake 4-7140-3	1955	4.0 (52)	7.8 (52)	9.5 (42)	10.8 (26)	12.5 (5)	13.3 (2)		
Rainy Lake 4-7170-3	1948	3.9 (44)	7.5 (44)	8.7 (8)	11.2 (2)	10.9 (1)			
Salmon Lake 4-7230-3	1948	3.5 (70)	8.4 (58)	10.5 (22)	12.4 (1)				
Salmon Lake 4-7230-3	1955	3.7 (50)	8.3 (50)	10.3 (48)	11.3 (18)	12.6 (1)			
Salmon Lake 4-7230-3	1961	3.2 (33)	6.6 (32)	9.4 (29)	10.5 (15)	11.7 (7)	13.0 (3)		
Seeley Lake 4-7260-3	1948	3.5 (15)	7.9 (15)	10.6 (13)	12.5 (7)	13.4 (3)			
Seeley Lake 4-7260-3	1954	3.6 (9)	8.4 (9)	10.8 (8)	12.3 (1)				
Seeley Lake 4-7260-3	1955	3.2 (47)	7.3 (47)	8.6 (45)	10.2 (19)				



Mountain Whitefish, *Prosopium williamsi* cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
BLACKFOOT RIVER DRAINAGE (Streams)								
Clear Water River 1951 4-1290-1	3.8 (55)	6.6 (31)	8.3 (21)	9.6 (12)	10.4 (3)			
CLARK FORK OF THE COLUMBIA RIVER DRAINAGE (Streams)								
~ Cedar Creek 5-1296-1	1957	4.0 (47)	7.6 (28)	10.2 (19)	12.2 (10)	13.5 (3)		
Clark Fork	1958	4.4 (54)	8.3 (26)	10.9 (18)	12.3 (12)			
Prospect Creek 5-5648-1	1960	2.6 (23)	5.4 (23)	7.3 (2)				
Rock Creek	1959	3.6 (160)	7.3 (129)	9.4 (69)	11.5 (26)	13.3 (9)	17.1 (1)	19.0 (1)
Rock Creek	1960	2.8 (377)	6.2 (209)	8.8 (168)	10.6 (94)	12.4 (49)	13.5 (28)	13.9 (16)
								16.7 (1)
								IX
								17.4 (1)
~ Trout Creek 5-7408-1	1957	3.6 (18)	5.9 (4)					
~ Vermillion River 5-7712-1	1960	2.6 (6)	4.7 (6)					
FLATHEAD RIVER DRAINAGE (Lakes)								
~ Doctor Lake 8-8520-3	1960	1.8 (7)	3.3 (7)	4.7 (7)	6.2 (7)	7.6 (6)	8.9 (5)	10.0 (4)
								XI
								12.7 (2)
								13.5 (2)
								13.6 (1)
								IX
Hungry Horse Res. 1958 8-8260-5	3.3 (103)	7.0 (99)	9.3 (77)	10.8 (48)	11.3 (14)	12.5 (3)	13.8 (2)	14.6 (2)



Mountain Whitefish, Promopium williamseni cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
FLATHEAD RIVER DRAINAGE (Lakes) cont.								
Hungry Horse Res. 1961 8-8860-5								
	3.4 (119)	7.4 (114)	10.0 (94)	11.8 (61)	12.7 (27)	13.7 (5)		
(Streams)								
Nine Mile 8-5040-1	1960	2.7 (9)	5.2 (8)	7.8 (7)	10.4 (2)			
MADISON RIVER DRAINAGE (Streams)								
Madison River 13-3440-1	1950	4.3 (68)	9.4 (68)	12.1 (63)	13.5 (44)	14.7 (12)	14.7 (1)	
MARIAS RIVER DRAINAGE (Streams)								
Cut Bank Creek 14-1120-1	1960	3.7 (33)	7.0 (32)	9.6 (21)	10.7 (5)			
Marias River (Dam Section) 14-3240-2	1961	4.1 (14)	6.3 (?)	11.0 (1)	12.1 (1)	14.4 (1)		
MISSOURI RIVER DRAINAGE (Lakes)								
Canyon Ferry Res. 1958 17-8832-5		5.2 (10)	8.2 (6)	9.9 (4)	11.8 (3)	13.5 (3)		
(Streams)								
Bel's Creek 17-544-1	1960	3.3 (27)	6.4 (24)	9.3 (22)	11.1 (18)	12.4 (11)	13.8 (4)	15.4 (2)
Big Spring Creek 16-3CO-1	1960	6.5 (9)	11.5 (9)	13.6 (9)	15.1 (5)	16.1 (3)		
Sheep Creek 17-6544-1	1960	3.2 (15)	6.2 (14)	8.3 (3)				
Smith River 17-6832-1	1960	3.7 (76)	7.4 (63)	9.4 (27)	10.6 (17)	11.7 (6)	12.9 (2)	



Mountain Whitefish, Prosopium williamsoni cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
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YELLOWSTONE RIVER

DRAINAGE

(Lakes)

East Rosebud Lake 1948 2.7 (16) 4.8 (16) 6.9 (15)

(Streams)

Boulder River 1948 4.0 (14) 8.0 (14) 10.9 (13) 12.6 (3) 14.5 (1)

East Rosebud Cr. 1948 3.5 (6) 7.8 (6) 10.7 (6) 12.2 (5) 13.4 (1)

Little Bighorn River 1959 3.9 (5) 7.6 (3) 9.9 (1) 10.9 (1)

Stillwater River 1948 4.1 (60) 7.9 (57) 10.4 (48) 12.2 (24) 14.8 (1) 16.5 (2) 16.2 (1)

West Fork Stillwater River 1952 3.2 (7) 6.5 (7) 9.9 (7) 13.0 (5)

West Rosebud Cr. 1948 2.6 (7) 5.4 (7) 8.9 (7) 11.3 (6) 12.7 (4)

Kokane, Onchorhynchus nerka

BLACKFOOT RIVER

DRAINAGE

(Lakes)

Placid Lake 1950 3.1 (5) 7.8 (5) 9.5 (4) 11.0 (4)

Salmon Lake 1961 4.1 (16) 8.8 (6)

CLARK FORK
COLUMBIA RIVER
DRAINAGE
(Lakes)

Middle Thompson Lake 1953 4.7 (32) 10.9 (31)



Kokanees, Oncorhynchus nerka cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
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CLARK FORK
COLUMBIA RIVER
DRAINAGE
(Lakes) cont.

Middle Thompson Lake 1958 4.2 (37) 8.4 (17) 10.6 (11)
5-9232-3

Georgetown Lake 1961 4.0 (8) 9.0 (8) 10.7 (5)
6-7961-5

YELLOWSTONE RIVER
DRAINAGE
(Lakes)

Dailey Lake 1955 4.5 (26) 10.2 (26) 13.4 (26) 16.2 (16) 18.4 (3)
22-7644-3

Coho Salmon, Oncorhynchus kisutch

BLACKFOOT RIVER
DRAINAGE
(Lakes)

Placid Lake 1948 3.3 (25) 7.3 (25) 9.5 (25) 10.9 (22) 10.9 (3)
4-7140-3

CLARK FORK
COLUMBIA RIVER
DRAINAGE
(Lakes)

Georgetown Lake 1950 5.2 (107) 10.6 (90)
6-7961-5

Georgetown Lake 1958 3.6 (8) 8.7 (8) 13.3 (3) 17.5 (2)
6-7961-5

Golden Trout, Salmo aguabonita

MADISON RIVER
DRAINAGE
(Lakes)

Avalanche Lake 1960 2.8 (10) 6.9 (10)
13-6880-3

Blne Danube Lake 1952 6.0 (15) 9.4 (14) 11.4 (13) 13.2 (6)
13-6960-3



Cutthroat Trout, *Salmo clarki*

Year Collected	I	II	III	IV	V	VI	VII	VIII
BEAVERHEAD RIVER DRAINAGE (Lakes)								
Deadman Lake 1-8720-3	1953	3.8 (15)	7.0 (14)	10.6 (6)				
(Streams)								
Clark Creek 1-1340-1	1952	3.1 (18)	5.5 (16)	8.0 (4)				
Clark Creek 1-1340-1	1952	3.2 (5)	6.3 (4)					
Taylor Creek 1-7600-1	1952	3.1 (4)	5.3 (4)	7.5 (1)				
BIG HOLE RIVER DRAINAGE (Lakes)								
Darkhorse Lake 2-7700-3	1953	4.2 (21)	6.7 (12)	9.6 (9)				
BITTERROOT RIVER DRAINAGE (Lakes)								
Lower Twin Lake 3-9475-3	1958	2.4 (32)	4.8 (32)	7.0 (32)	11.3 (3)	14.4 (1)		
(Streams)								
Hughes Creek 3-2775-1	1952	3.4 (53)	5.8 (34)	7.3 (4)				
Lost Horse Creek 3-3500-1	1961	2.5 (11)	4.4 (9)	6.3 (4)	6.3 (1)			
Meadow Creek 3-3800-1	1952	3.0 (63)	4.9 (51)	6.5 (29)	8.0 (6)			
Miller Creek 3-3975-1	1959	2.8 (53)	5.5 (33)	7.3 (4)				
Miller Creek 3-3975-1	1961	3.0 (19)	5.1 (4)	7.4 (3)				
South Fork Skalkaho Creek 3-5850-1	1962	2.8 (28)	5.0 (25)	6.9 (11)	8.5 (5)			



Cutthroat Trout, Salmo clarki cont.

Year Collected	I	II	III	IV	V	VI	VII
BLACKFOOT RIVER DRAINAGE (Lakes)							
Alva Lake 4-6120-3							
1948	3.7 (76)	7.1 (56)	10.7 (32)	13.2 (6)			
Alva Lake 4-6120-3	1955	2.7 (8)	5.7 (8)	8.5 (7)	12.3 (5)		
Jez Lake 4-6720-3	1961	2.4 (5)	4.7 (5)	6.9 (5)	11.5 (5)	15.0 (5)	
Lower Twin Lakes 4-6900-3	1961	2.9 (7)	4.4 (7)	9.8 (6)	12.4 (2)		
Parker Lake 4-7080-3	1959	3.0 (58)	6.7 (57)	10.2 (39)	12.7 (11)	17.2 (1)	
Placid Lake 4-7140-3	1948	3.7 (46)	6.0 (46)	9.0 (42)	11.6 (20)	13.5 (5)	
Placid Lake 4-7140-3	1956	2.5 (4)	5.6 (6)	9.9 (5)	11.2 (3)		
Placid Lake 4-7140-3	1956	2.5 (29)	5.0 (29)	8.4 (28)	11.0 (14)	13.2 (4)	
Rainy Lake 4-7170-3	1948	3.5 (10)	6.4 (75)	9.5 (26)	10.0 (2)		
Salmon Lake 4-7230-3	1948	2.9 (6)	5.3 (26)	8.9 (22)	11.2 (12)		
Seelye Lake 4-7260-3	1948	3.3 (2)	6.1 (52)	10.8 (45)	11.7 (16)	12.3 (1)	
Seelye Lake 4-7260-3	1955	2.2 (22)	4.7 (22)	8.8 (22)	11.4 (13)		
Upper Twin Lake 4-7530-3	1961	3.4 (11)	6.6 (12)	10.8 (11)	15.0 (11)	18.0 (5)	
Webb Lake 4-7590-3	1959	3.2 (31)	7.6 (21)	10.0 (16)	13.5 (7)		
(Streams)							
Blackfoot River 4-660-1	1948	4.1 (24)	8.1 (19)	12.5 (2)			



Cutthroat Trout, Salmo clarki cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII	
BLACKFOOT RIVER DRAINAGE (Streams) cont.									
Clearwater River 1957 4-1290-1									
Placid Creek 1950 4-4230-1									
West Fork Clearwater River 1950 4-5730-1	2.6 (41)	4.6 (25)	6.8 (6)	3.3 (84)	5.4 (44)	8.2 (10)	3.2 (51)	5.4 (18)	7.3 (3)
CLARK FORK COLUMBIA RIVER DRAINAGE (Lakes)									
Bowman Lake 1961 6-7467-3	2.8 (24)	6.1 (26)	8.9 (25)	2.3 (17)	7.1 (17)	10.0 (17)	4.1 (8)	5.7 (7)	
Cabin Lake 1961 5-8495-3	2.3 (17)	7.1 (17)	10.0 (17)	3.1 (13)	6.4 (13)	9.3 (8)	3.1 (13)	6.4 (13)	11.0 (4)
Carp Lake 1951 6-9576	4.1 (8)	5.7 (7)		3.3 (91)	8.7 (91)	13.8 (67)	16.5 (53)	19.1 (1)	
Georgetown Lake 1950 6-7961-5	3.3 (91)	8.7 (91)	13.8 (67)	3.8 (25)	8.9 (25)	14.1 (22)	17.6 (17)	19.4 (5)	
Georgetown Lake 1958 6-7961-5	3.9 (124)	9.4 (119)	13.6 (47)	3.9 (124)	9.4 (119)	13.6 (47)	16.7 (15)	21.3 (1)	
Georgetown Lake 1960 6-7961-5	2.5 (111)	6.1 (111)	9.8 (99)	2.7 (8)	7.0 (8)	10.6 (3)	12.8 (53)	14.0 (1)	
Georgetown Lake 1961 6-7961-5	2.7 (8)	7.0 (8)	10.6 (3)	2.8 (23)	5.1 (23)	6.8 (16)	8.5 (3)		
Lower Elliot Lake 1959 6-8540-3	2.8 (23)	5.1 (23)	6.8 (16)	2.8 (23)	5.1 (23)	6.8 (16)	8.5 (3)		



Cutthroat Trout, Salmo clarki cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
CLARK FORK COLUMBIA RIVER DRAINAGE								
(Lakes) cont.								
Lower Thompson Lake 5-9152-3	1955	3.1 (11)	6.3 (9)	9.2 (6)				
Lower Thompson Lake 5-9152-3	1956	2.7 (10)	6.2 (10)	9.5 (5)	11.8 (1)			
Medicine Lake 6-8702-3	1956	3.0 (40)	6.3 (35)	10.2 (13)	12.4 (3)			
Middle Thompson Lake	1956	2.3 (29)	5.2 (29)	8.7 (24)	12.1 (10)	15.4 (3)	17.7 (1)	
Stoney Lake 6-9272-3	1961	3.6 (30)	6.7 (35)	9.3 (25)	11.4 (14)	14.0 (3)		
Upper Elliot 6-8797-3	1959	2.7 (49)	4.9 (49)	6.6 (25)	8.8 (2)			
(Streams)								
Boiling Springs Creek 5-736-1	1952	4.2 (27)	7.2 (3)					
Boulder Creek 6-646-1	1961	3.6 (35)	6.3 (12)	9.0 (1)				
Cedar Creek 5-1296-1	1957	3.3 (21)	5.9 (7)	6.6 (1)				
Clark Fork Station 10	1961	2.8 (10)	7.4 (5)	14.3 (1)				
Dry Creek 5-2160-	1957	3.4 (33)	5.8 (5)	8.2 (1)				
Flint Creek 6-2261-1	1953	2.6 (22)	4.9 (12)	6.8 (5)	9.2 (2)			
Little Blackfoot River 6-3591-1	1956	3.0 (38)	5.4 (19)	7.2 (2)				



Cutthroat Trout, Salmo clarki cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
CLARK FORK COLUMBIA RIVER DRAINAGE (Streams) cont.								
Little Blackfoot River 6-3591-1								
1960	3.1 (19)	5.8 (16)	7.2 (1)					
Mill Creek 5-4800-1	1959	4.0 (10)	6.4 (3)	9.1 (1)				
Prospect Creek 5-5648-1	1960	1.9 (13)	4.2 (9)	7.1 (2)	10.4 (1)			
Ranch Creek 6-5111-1	1959	3.4 (60)	5.8 (40)	8.2 (16)	10.8 (2)			
Rock Creek	1948	3.4 (7)	6.0 (5)					
Rock Creek	1953	2.7 (138)	6.5 (130)	9.9 (37)	12.7 (5)	15.4 (2)		
Rock Creek	1959	2.8 (106)	5.8 (100)	8.7 (36)	12.3 (3)	15.7 (1)		
Rock Creek	1960	2.9 (24)	5.1 (9)	10.6 (1)				
Slimmer Creek 5-6416-	1953	3.7 (11)						
Trout Creek 5-7408-1	1957	2.7 (42)	5.8 (14)					
Twelve Mile Creek 5-7488-1	1953	3.4 (10)	5.2 (8)	7.3 (3)				
Twelve Mile Creek 5-7488-1	1953	2.4 (46)	4.6 (15)	6.2 (1)				
Upper Willow Cr. 6-6783-1	1948	3.3 (58)	5.1 (48)	6.7 (16)				
Vermillion Creek 5-7712-1	1960	2.0 (11)	4.3 (6)	6.9 (1)				
West Fork Rock Creek 6-7030-1	1956	2.8 (43)	5.0 (38)	6.9 (18)	8.5 (2)			



Cutthroat Trout, Salmo clarki cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
FLATHEAD RIVER DRAINAGE (Streams) cont.								
Little Salmon River 8-4220-1	1960	2.4 (21)	5.1 (20)	8.4 (20)	10.1 (7)			
Logan Creek 7-2500-1	1950	2.7 (21)	4.8 (14)	6.3 (1)	10.5 (1)	12.2 (1)		
Logan Creek 7-2500-1	1952	2.6 (10)	4.6 (7)					
Logging Creek (Glacier Park)	1960	2.0 (7)	4.3 (2)					
Main Flathead River	1959	2.2 (44)	4.7 (43)	8.6 (40)	12.0 (23)	12.3 (6)		
Martin Creek	1960	2.8 (24)	5.8 (5)	9.3 (1)				
Middle Fork Flathead River 8-4740-1	1956	2.8 (32)	5.2 (32)	8.2 (21)	12.8 (1)			
Middle Fork Flathead River 8-4740-1	1960	2.5 (53)	4.6 (45)	6.3 (25)	9.3 (6)			
Moose Creek 8-4880-1	1952	3.0 (24)	4.8 (17)	6.6 (8)	8.9 (3)			
Nine Mile Creek 8-5040-1	1960	2.1 (77)	4.3 (37)	6.9 (11)	9.3 (6)	11.1 (1)		
North Fork Flathead River 8-5100-1	1959	2.3 (123)	5.0 (104)	7.0 (40)	11.0 (4)			
North Fork Flathead River 8-5100-1	1960	2.4 (171)	5.0 (148)	8.0 (56)	12.5 (19)	14.6 (2)		
Quartz Creek (Glacier Park)	1961	2.1 (8)	4.2 (5)	5.6 (1)				
Red Meadow Creek	1960	2.6 (3)	6.7 (3)	10.0 (3)	14.4 (3)			



Cutthroat Trout, Salmo clarki cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
FLATHEAD RIVER DRAINAGE (lakes)								
Ashley Lake 7-5220-3	1951	4.8 (2)	9.4 (2)	14.0 (2)	15.3 (1)			
Ashley Lake 7-5220-3	1951	4.2 (3)	7.4 (3)	10.3 (3)	15.6 (3)			
Ashley Lake 7-5220-3	1951	4.2 (10)	8.5 (10)	14.7 (10)	13.2 (1)	16.5 (1)		
Big Salmon Lake 8-8140-	1960	2.4 (36)	4.9 (36)	7.9 (31)	11.1 (16)	12.7 (2)		
Cedar Lake 7-5680-3	1956	2.3 (26)	5.0 (25)	7.6 (19)	9.6 (4)	11.0 (1)		
Cyclone Lake 8-8480-3	1960	2.4 (7)	4.0 (5)	6.7 (5)	9.8 (3)	9.8 (1)		
Doctor Lake 8-8520-3	1960	2.1 (21)	4.9 (21)	6.9 (21)	8.9 (19)	10.3 (13)	11.3 (3)	
Lower Fish Lake 7-7540-3 #1	1961	3.1 (20)	5.5 (17)	7.5 (17)	9.1 (8)			
Upper Fish Lake 7-9320-3 #2	1961	2.8 (6)	6.0 (6)	9.4 (5)	11.0 (1)			
Hemlock Lake 7-6680-3	1950	5.3 (5)	7.6 (5)	8.6 (1)				
Hungry Horse Res. 8-8360-3	1958	2.8 (70)	5.8 (66)	9.5 (45)	12.2 (23)	13.7 (6)		
Hungry Horse Res. 8-8860-3	1958	2.0 (13)	3.3 (10)	7.3 (10)	11.3 (9)	12.9 (8)	14.5 (3)	
Hungry Horse Res. 8-8860-3	1961	2.4 (51)	4.6 (51)	8.0 (43)	12.3 (37)	14.5 (29)	15.2 (7)	
Kintla Lake (Glacier Park)	1960	2.4 (4)	5.9 (4)	10.0 (3)	11.7 (3)			
Koosler Lake 8-9000-3	1960	2.4 (13)	5.6 (15)	9.1 (15)	11.5 (12)			
Lick Creek Lake 8-9100-	1960	3.0 (8)	6.2 (8)	9.3 (5)	12.0 (2)			





Cutthroat Trout, *Salmo clarki* cont.

	Year Collected	I	II	III	IV	V	VI	VII	VIII
FLATHEAD RIVER DRAINAGE									
(Streams) cont.									
Smith Creek 7-4000-1	1951	3.0 (9)	5.8 (9)	8.9 (3)					
Stillwater River 7-4420-1	1960	2.2 (16)	4.8 (15)	8.4 (14)	12.4 (13)	14.3 (4)			
Tuchuck Creek 8-7400-1	1960	2.7 (23)	4.2 (18)						
White River 8-7820-1	1960	2.1 (39)	4.9 (39)	7.5 (26)	10.8 (6)	13.8 (3)			
GALLATIN RIVER DRAINAGE									
(Lakes)									
Albino Lake 9-7220-3	1960	2.9 (74)	6.5 (70)	10.7 (28)	14.4 (7)				
Big Brother Lake 9-7448-3	1960	3.6 (7)	5.9 (7)	8.5 (6)	9.9 (2)				
Hyalite Reservoir 9-8512-5	1952	3.8 (7)	10.9 (7)						
Lower Jerome Rock Lake 9-8550-3	1960	3.5 (8)	6.8 (8)	8.7 (3)	12.6 (1)				
Lower Spanish Lake 9-9424-3	1960	3.1 (15)	6.3 (13)	10.3 (9)	13.4 (3)				
Middle Jerome Rock Lake 9-8550-3	1960	3.9 (9)	7.4 (9)	10.0 (5)	9.9 (1)				
Solitude Lake 9-9386-3	1960	3.0 (21)	5.8 (21)	8.1 (15)	9.7 (2)				
Summit Lake 9-9462-3	1960	3.9 (16)	8.0 (16)	11.3 (11)	13.2 (4)				
Thompson Lake 9-9500-3	1960	3.6 (27)	6.7 (27)	9.8 (20)	11.5 (4)				



Cutthroat Trout, Salmo clarki cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
GALLATIN RIVER DRAINAGE (Lakes) cont.								
Upper Falls Creek Lake 9-9994-3								
1960	2.8 (14)	6.4 (14)						
Upper Jerome Rock Lake 9-8550-3	1960	3.1 (6)	6.0 (6)	9.1 (6)	11.2 (6)			
Upper Spanish Lake 9-9424-3	1960	3.6 (3)	7.3 (3)	14.0 (2)	18.4 (2)			
JEFFERSON DRAINAGE (Lakes)								
Delmo Lake 10-8600-5	1953	3.5 (8)	7.9 (8)	11.1 (4)				
KOOTENAI RIVER DRAINAGE (Lakes)								
Hoskin Lake 11-8540-3	1957	2.0 (20)	6.5 (20)	10.6 (20)	13.7 (2)			
Lower Wolverine Lake 11-9090-3	1957	2.6 (9)	5.3 (9)	7.7 (9)	10.0 (3)			
Middle Wolverine Lake 11-9175-3	1957	2.4 (17)	5.3 (17)	7.6 (17)	9.1 (7)	10.4 (1)		
Therriault Lake 11-9760-3	1957	2.3 (30)	4.7 (26)	7.0 (22)	9.2 (16)	10.9 (10)	12.4 (3)	14.5 (1)
Upper Wolverine Lake 11-9930-3	1957	2.6 (21)	5.3 (27)	7.8 (25)				
Weasel Lake 11-9970-3	1957	2.3 (46)	4.5 (45)	6.3 (36)	7.6 (19)			
(Streams)								
Flower Creek 11-2440-1	1950	2.8 (21)	4.9 (12)	7.0 (4)				



Cutthroat Trout, Salmo clarki cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
KOOTENAI RIVER DRAINAGE (Streams) cont.								
Flower Creek 11-2440-1	1959	2.5 (17)	4.5 (15)	6.4 (8)	9.2 (1)			
O'Brien Creek 11-4820-1	1950	3.3 (74)	5.6 (21)	7.6 (2)				
Young Creek 11-7780-1	1952	3.7 (6)	5.4 (2)					
MADISON RIVER DRAINAGE (Lakes)								
Bald Mt. Lake	1951	4.7 (9)	8.0 (7)	10.4 (4)				
MILK RIVER DRAINAGE (Streams)								
Beaver Creek 15-280-1	1957	3.4 (4)	6.5 (1)					
MISSOURI RIVER DRAINAGE (Lakes)								
Middle Creek Res. (Hound Creek Res.) 17-9280-7	1951	4.4 (7)	9.8 (5)	13.1 (3)				
(Streams)								
Dry Fork Smith River 17-2096-1	1952	4.6 (12)	7.0 (10)					
Elkhorn Creek 17-2624-1	1952	4.9 (7)	9.3 (7)					
Running Wolf Cr. 16-3160-2	1961	3.0 (5)	5.0 (2)					



Cutthroat Trout, Salmo clarki cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
MUSSELSHELL RIVER DRAINAGE (Lakes)								
Holiday Lake 18-7860-7								
1954	3.1 (13)	10.0 (13)	14.2 (2)	15.1 (1)				
Holiday Lake 18-7860-7	1961	3.9 (14)	9.9 (14)	16.0 (3)	12.5 (1)			
SUN RIVER DRAINAGE (Lakes)								
Bear Lake 20-6950-3	1960	2.8 (16)	6.6 (16)	11.0 (16)	14.3 (1)			
YELLOWSTONE RIVER DRAINAGE (Lakes)								
Aldridge Lake 22-7140-3	1959	3.0 (2)	7.0 (2)	14.2 (2)				
Glacier Reservoir 22-7980-3	1959	3.4 (7)	5.9 (7)	8.1 (7)	10.1 (7)			
Lady of the Lake 22-8310-3	1950	3.2 (21)	6.1 (21)	9.0 (21)	10.9 (8)			
Lower Aero Lake 22-8526-3	1952	3.6 (10)	7.7 (10)	11.5 (10)	13.5 (4)			
1st Rock Creek Lake 22-7868-3	1949	3.4 (8)	5.4 (8)	7.7 (6)				
(Streams)								
Boulder River	1948	4.2 (14)	7.5 (7)					
Crooked Creek 22-1512-1	1950	3.3 (31)	6.3 (31)	8.6 (8)				
East Boulder River 22-2002-1	1950	2.8 (4)	4.4 (3)	6.1 (1)				
Lake Fork Rock Cr. 1949		3.1 (11)	5.1 (6)	6.6 (1)				



Cutthroat Trout, Salmo clarki cont.

Rainbow Trout, *Salmo gairdneri*

BEAVERHEAD RIVER DRAINAGE (Streams)							
McDonald Pond 1-9100-7	1955	3.7 (72)	10.4 (44)	16.2 (30)	19.3 (8)	21.7 (3)	21.6 (1)
McDonald Pond 1-9100-7	1960	4.0 (9)	6.8 (2)	18.2 (1)			
Widow's Pool (Culver Pond) 1-8680-5	1955	4.7 (89)	10.0 (43)	14.4 (21)	17.4 (9)	20.6 (1)	
Beaverhead River 1-500-1	1961	2.7 (11)	8.9 (9)	13.2 (9)	14.9 (3)		
Big Sheep Creek 1-6740-1	1953	3.5 (56)	8.2 (31)	11.5 (21)	12.2 (2)		
Decker Creek 1-1967-0	1953	3.9 (10)	8.6 (7)	11.9 (4)			
Grasshopper Creek 1-3100-1	1952	3.4 (18)	7.5 (4)	10.3 (1)	12.8 (1)	14.5 (1)	
Ruby River 1-6360-1	1953	3.1 (55)	6.1 (40)	8.7 (14)	11.5 (3)		

BIG HOLE RIVER
DRAINAGE
(Lakes)

Ajax Lake 2-7150-3	1959	3.5 (19)					
Crystal Lake 2-7675-3	1958	2.9 (10)	6.1 (7)	8.6 (3)	11.6 (3)	12.8 (1)	



Rainbow Trout, Salmo gairdneri cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
BIG HOLE RIVER DRAINAGE								
(Lakes) cont.								
Lion Lake 2-8400-3	1958	2.9 (11)	7.3 (8)	10.7 (1)				
Mystic Lake 2-8650-3	1958	2.5 (20)	6.0 (20)	9.4 (13)	11.2 (9)	11.7 (1)		
Rock Island Lake No. 1 2-8925-3	1959	3.7 (19)	7.4 (12)	9.7 (5)	11.6 (4)			
Upper Miner Lake No. 2 2-9475-3	1960	3.5 (5)	6.0 (5)	8.7 (5)	11.2 (5)	14.0 (5)		
(Streams)								
Big Hole River 2-425-1	1952	4.6 (13)	7.8 (3)	12.4 (1)				
Deep Creek 2-1625-1	1959	2.3 (12)	5.0 (10)	7.1 (2)				
LaMarche Creek 2-3175-1	1959	2.2 (11)	4.7 (8)	6.6 (2)				
Pattengail Creek 2-4500-1	1959	2.9 (23)	5.9 (2)					
Rock Creek 2-4900-1	1959	2.9 (48)	5.1 (33)	6.7 (7)	8.9 (2)			
Wise River 2-7025-1	1959	2.6 (24)	5.4 (6)	7.5 (2)	11.9 (1)			
BITTERROOT RIVER DRAINAGE								
(Streams)								
Lolo Creek 3-3475-1	1950	3.2 (6)	5.9 (5)	6.8 (1)				
BLACKFOOT RIVER DRAINAGE								
(Lakes)								
Browns Lake 4-6210-4	1961	4.1 (30)	7.2 (30)	10.9 (2)				



Rainbow Trout, *Salmo gairdneri* cont.



Rainbow Trout, Salmo gairdneri cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
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CLARK FORK

COLUMBIA RIVER

DRAINAGE

(Lakes) cont.

Racetrack Lake 6-9044-3	1955	2.5 (11)	6.4 (11)	9.9 (10)	12.2 (5)			
Racetrack Lake 6-9044-3	1958	2.7 (20)	6.6 (19)	10.2 (5)	12.7 (3)	14.1 (1)		
Storm Lake 6-9291-3	1958	4.4 (15)	7.4 (9)	11.8 (9)	15.1 (5)			

(Streams)

Cataract Creek 5-1232-1	1959	3.2 (8)	6.7 (8)	11.4 (7)	14.8 (2)			
Flint Creek 6-2242-1	1953	2.6 (64)	5.3 (52)	7.5 (29)	9.0 (13)			
Prospect Creek 5-5646-1	1960	2.7 (11)	4.6 (4)	6.2 (1)				
Rock Creek	1948	3.0 (33)	5.8 (28)	8.8 (5)	11.3 (?)			
Rock Creek	1958	2.8 (265)	6.7 (253)	10.7 (144)	13.3 (55)	15.8 (6)	17.0 (2)	
Rock Creek	1959	3.0 (213)	6.8 (179)	10.9 (95)	14.0 (50)	16.7 (4)		
Rock Creek	1960	2.9 (118)	6.4 (40)	10.2 (17)	12.1 (5)	14.8 (3)		

FLATHEAD RIVER

DRAINAGE

(Lakes)

Basham Lake 7-5240-3	1961	2.7 (8)	5.4 (8)	7.9 (8)	11.9 (2)			
Blue Lake 8-8220-3	1961	2.5 (5)	5.7 (5)	9.9 (5)				
Lena Lake 8-9080-3	1960	2.5 (12)	6.2 (12)	9.9 (10)	12.3 (1)			



Rainbow Trout, Salmo gairdneri cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
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FLATHEAD RIVER
DRAINAGE
(Lakes)

Little Bitterroot Lake 7-7300-5	1951	2.7 (14)	9.2 (14)	13.9 (14)				
McGilvary Lake 7-7720-3	1961	2.6 (27)	5.8 (27)	10.8 (27)				
Woodward Lake 8-9980-3	1959	2.8 (21)	5.8 (21)	9.8 (19)	13.0 (13)	14.6 (8)		

(Streams)

Logan Creek 7-2500-1	1950	2.4 (6)	5.0 (4)	6.7 (1)				
Logan Creek 7-2500-1	1950	2.6 (6)	4.7 (4)					
Martin Creek	1960	3.2 (20)	8.4 (7)	10.9 (2)				
Swan River 7-4560-1	1956	2.4 (34)	5.2 (23)	8.6 (10)	13.6 (2)			

GALLATIN RIVER
DRAINAGE
(Lakes)

Cascade Lake 9-7638-3	1960	2.5 (6)	6.5 (6)	9.2 (6)	11.2 (4)	13.4 (1)		
Diamond Lake 9-7942-3	1960	1.9 (9)	5.7 (9)					

(Streams)

West Gallatin River	1948-49	3.2 (76)	6.5 (70)	8.9 (30)	12.1 (4)	15.6 (2)		
	1948-49	3.1 (133)	6.1 (83)	9.4 (29)	12.4 (6)	13.2 (2)		



Rainbow Trout, Salmo gairdneri, cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
JEFFERSON RIVER DRAINAGE (Lakes)								
Willow Creek Res. 1949 (Harrison Dam) 10-9440-5								
Willow Creek Res. 1954 (Harrison Dam) 10-9440-5	4.0 (96)	10.2 (96)	15.6 (95)	19.4 (87)	21.6 (30)	21.0 (3)		
Willow Creek Res. 1955 (Harrison Dam) 10-9440-5	3.5 (69)	9.1 (69)	14.1 (63)	18.3 (22)	20.2 (2)			
Willow Creek Res. 1960 (Harrison Dam) 10-9440-5	3.3 (258)	7.9 (246)	12.9 (233)	16.5 (152)	18.8 (68)	18.1 (2)		
Willow Creek Res. 1961 (Harrison Dam) 10-9440-5	2.9 (30)	7.3 (12)	11.1 (9)	12.9 (2)	14.9 (2)	16.1 (2)		
KOOTENAI RIVER DRAINAGE (Lakes)								
Bull Lake 7-5540-3	1957	2.9 (6)	5.8 (6)	10.7 (6)	13.1 (6)			
Kiltrennan Lake 11-8640-3	1956	2.6 (19)	5.7 (17)	8.7 (10)	11.2 (1)			
Little Therreault Lake 11-8920-3	1957	3.9 (9)	7.7 (5)	12.8 (3)	15.1 (1)			
(Streams)								
Big Cherry Creek 11-400-1	1959	2.6 (12)	4.0 (3)					
Big Creek 11-420-1	1952	3.9 (23)						
Fisher River 11-2320-1	1959	3.0 (28)	5.3 (2)					
Pinkham Creek 11-5140-1	1951	4.5 (28)	6.6 (3)					





Rainbow Trout, Salmo gairdneri cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
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MADISON RIVER

DRAINAGE

(Streams) cont.

Odell Creek (Clark Creek) 13-4400-1	1951	3.5 (42)	6.5 (10)	17.0 (3)	16.2 (1)			
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Madison River 13-3480-1	1948	3.3 (43)	6.5 (26)	13.6 (15)	15.6 (9)	17.1 (2)	17.5 (1)	
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Madison River 13-3480-1	1950	4.3 (201)	9.4 (148)	12.6 (65)	14.9 (21)	18.5 (1)		
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MARIAS RIVER

DRAINAGE

(Lakes)

Eureka Lake 14-7320-5	1960	3.0 (30)	12.0 (30)	19.0 (29)				
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Kipp Lake 14-7960-5	1959	4.7 (46)	14.5 (32)	21.0 (27)	22.0 (3)			
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Lake Francis 14-7440-5	1948	3.3 (40)	8.2 (39)	13.5 (31)	16.5 (21)	17.5 (2)		
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Lower Mission Lake 14-8080-3	1961	2.9 (33)	8.4 (33)	12.9 (5)	16.1 (1)			
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Tiber Reservoir 14-9240-5	1958	8.7 (50)	11.5 (23)					
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(Streams)

Cut Bank Creek 14-1120-1	1960	2.6 (25)	6.5 (25)	10.5 (21)	13.0 (4)	15.8 (1)		
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Dry Fork Marias River 14-1520-9	1960	2.2 (11)	8.8 (11)	12.0 (8)				
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Marias River (Lugusley) 14-3240-2	1961	3.4 (19)	8.9 (7)	12.1 (5)	13.3 (4)			
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Marias River 14-3240-2	1961	3.3 (35)	9.6 (32)	12.1 (21)	12.2 (1)			
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Rainbow Trout, Salmo gairdneri cont.

	Year Collected	I	II	III	IV	V	VI	VII	VIII
MILK RIVER DRAINAGE (Lakes)									
Kuhr Newhouse Reservoir 15-5920-7									
Kuhr Newhouse Reservoir 15-5920-7	1960	2.9 (35)	6.1 (26)	8.7 (18)					
Kuhr Reservoir 15-5880-7	1960	4.6 (7)							
Miller Reservoir #6 15-6400-7	1960	2.7 (38)	6.8 (33)	8.0 (4)					
(Streams)									
Beaver Creek 15-280-1	1957	2.9 (15)	5.7 (15)	8.9 (5)					
Big Sandy Creek 15-440-1	1958	2.7 (47)	5.1 (26)	7.1 (26)					
Clear Creek 15-960-1	1957	2.9 (33)	5.2 (27)	6.8 (10)					
MISSOURI RIVER DRAINAGE (Lakes)									
Canyon Ferry Res. 17-8832-5	1958	3.4 (13)	7.2 (12)	13.8 (10)	17.1 (7)	19.0 (1)			
Cunningham Pond Farm Pond	1952	3.8 (8)	7.9 (6)	13.1 (6)	16.0 (3)	18.2 (1)			
Fort Peck Res. 16-5140-5	1948	3.4 (96)	7.8 (96)	12.3 (87)	17.0 (76)	20.0 (51)	21.1 (14)	21.8 (3)	
Fort Peck Res. 16-5140-5	1949	3.4 (39)	7.6 (39)	12.0 (38)	15.6 (29)	18.6 (16)	19.6 (5)	21.4 (2)	
Fort Peck Res. 16-5140-5	1950	3.0 (60)	7.3 (60)	12.6 (58)	16.3 (34)	17.6 (8)	21.0 (2)		
Fort Peck Res. 16-5140-5	1950	3.2 (63)	6.8 (63)	11.5 (63)	15.9 (51)	19.6 (23)	21.4 (6)		
Fresno Lake 15-5240-5	1952	3.1 (14)	7.1 (14)	13.2 (10)	16.3 (2)				



Rainbow Trout, Salmo gairdneri cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
MISSOURI RIVER DRAINAGE (Lakes)								
North Fcrk Smith River Reservoir (Lake Southerlin) 17-9616-5								
North Fcrk Smith River Reservoir (Lake Southerlin) 17-9616-5	1952	4.3 (12)	9.5 (7)	12.9 (3)	14.5 (1)			
Stafford Lake 16-8380-7	1960	3.7 (9)	9.1 (9)	11.2 (5)	15.0 (1)			
(Streams)								
Belt Creek 17-544-1	1960	3.0 (46)	5.6 (27)	10.0 (3)				
Big Spring Creek 16-300-1	1960	4.6 (56)	11.4 (28)	14.9 (13)	17.5 (2)	20.6 (1)		
Eagle Creek 16-1320-1	1958	3.1 (41)	6.5 (27)	7.6 (2)				
Judith River 16-1820-1	1951	3.1 (53)	5.5 (33)	9.0 (1)				
Missouri River (Holter Dam) 17-4896-1	1948	3.5 (238)	8.6 (145)	11.7 (70)	14.2 (17)	15.9 (1)	17.1 (1)	
Missouri River (Great Falls) 17-4880-1	1953	3.7 (14)	9.6 (10)	10.7 (1)				
Otter Creek 17-5696-1	1952	3.7 (8)	6.2 (5)	8.4 (5)				
Prickley Pear Cr. 17-6016-1	1949	2.8 (333)	6.4 (175)	10.0 (43)	11.9 (10)	16.4 (1)		
Prickley Pear Cr. 17-6016-1	1950-51	3.5 (747)	6.6 (270)	9.4 (63)	11.8 (10)	16.7 (1)		
Running Wolf Cr. 16-3160-1	1951	3.2 (11)	6.3 (2)					
Running Wolf Cr. 16-3160-1	1961	3.0 (23)	5.7 (16)	6.0 (3)				
Sheep Creek 17-6544-1	1951	4.6 (188)	6.8 (66)	8.6 (19)	9.8 (2)			



Rainbow Trout, Salmo gairdneri cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
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MISSOURI RIVER

DRAINAGE

(Streams) cont.

Sheep Creek 17-6544-1	1952	2.7 (19)	5.5 (18)	7.3 (15)	10.7 (3)			
Sheep Creek 17-6544-1	1960	2.7 (40)	6.0 (29)	8.2 (8)				
Smith River 17-6832-1	1952	3.7 (35)	6.9 (25)	9.7 (10)	12.8 (5)	16.5 (1)		
South Fork Judith River 16-3520-1	1951	4.2 (9)	6.5 (5)					
Tenderfoot Creek 17-7536-1	1960	2.7 (86)	5.3 (77)	7.7 (39)	9.5 (12)	12.1 (4)		
Wolf Creek 16-4180-1	1961	2.7 (15)						

MUSSELSHELL RIVER

DRAINAGE

(Lakes)

Dead Mans Basin Lake 18-7540-5	1961	3.4 (18)	9.1 (18)	9.2 (1)	10.2 (1)			
Holiday Lake 18-7860-7	1954-58	3.7 (10)	9.8 (7)	14.7 (4)	18.6 (2)			
Holiday Lake 18-7860-7	1960	3.7 (12)	9.6 (12)	13.7 (6)				
Holiday Lake 18-7860-7	1961	3.6 (53)	7.9 (44)	12.4 (26)	20.4 (1)			
(Streams)								
South Fork Musselshell River 18-5670-1	1950	3.3 (26)	6.1 (5)	6.9 (1)				



Rainbow Trout, Salmo gairdneri cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
ST. MARY'S RIVER DRAINAGE (Lakes)								
Duck Lake 19-1000-3								
1955	5.3 (26)	16.8 (26)	22.0 (26)	25.5 (1)				
SUN RIVER DRAINAGE (Lakes)								
Gibson Reservoir 20-7350-5	1960	3.2 (16)	8.1 (16)	11.2 (10)	14.6 (1)			
Nilan Reservoir 20-7900-5	1960	9.1 (34)	14.1 (9)					
Willow Creek Res. 20-8500-5	1959	3.4 (42)	7.3 (32)	12.4 (23)	17.5 (13)	18.2 (2)		
(Streams)								
Middle Fork Sun River 20-6400-1	1951	3.3 (94)	6.8 (89)	8.7 (29)	11.2 (10)			
North Fork Sun River 20-6400-1	1960	2.9 (7)	5.9 (7)	10.2 (4)	12.6 (1)			
Sun River 20-6100-1	1948	3.8 (27)	7.4 (24)	11.1 (15)	13.8 (6)			
YELLOWSTONE RIVER DRAINAGE (Lakes)								
Dailey Lake 22-7644-3	1955	3.9 (141)	9.2 (141)	15.3 (105)	18.7 (21)			
East Rosebud Lake 22-7714-3	1948	3.1 (26)	5.3 (22)	7.7 (9)	9.7 (4)			
Fairy Lake 22-7826-3	1960	2.6 (7)	7.4 (7)	9.6 (4)				
Otteusen Res. 21-6400-7	1959	2.9 (12)	9.6 (12)	12.3 (12)				
Sioux Charley Lake 22-9198-3	1949	3.4 (6)	6.7 (5)					



Rainbow Trout, Salmo gairdneri cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
YELLOWSTONE RIVER DRAINAGE (Lakes) cont.								
Trinity Spring 1951								
	5.0 (10)							
Willow Creek Res. 1949 22-9786-5	2.9 (11)	8.4 (11)	14.2 (11)	16.8 (11)	19.2 (1)			
Willow Creek Res. 1959 22-9786-5	3.5 (56)	6.2 (56)	9.1 (45)	11.1 (14)				
(Streams)								
Boulder River 1948	3.1 (84)	5.9 (68)	9.2 (9)	10.6 (3)				
East Boulder River 22-2002-1	2.7 (134)	4.8 (80)	6.8 (39)	12.0 (11)	10.6 (3)	12.1 (1)		
East Fishtail Cr. 1948 22-2058-1	3.8 (10)	6.6 (9)	8.8 (5)	10.2 (1)				
East Rosebud Cr. 1948 22-2254-1	3.3 (40)	5.6 (38)	7.4 (10)	7.2 (1)				
Little Bighorn River 22-3668-1	3.6 (20)	6.1 (19)	9.0 (1)					
Rock Creek 22-4942-1	3.6 (6)	7.8 (6)	10.7 (3)					
Rock Creek 22-4942-1	3.6 (15)	6.3 (12)	8.3 (2)					
Stillwater River 1948	3.3 (70)	7.3 (67)	10.3 (32)	13.5 (14)	16.2 (1)			
Tongue River 22-1250-1	8.8 (15)							
West Boulder River 22-6552-1	2.7 (11)	5.6 (11)	7.5 (1)					
West Fork Stillwater River 22-6664-1	3.5 (26)	6.2 (24)	8.6 (22)	10.2 (17)	12.5 (5)			



Rainbow Trout, Salmo gairdneri cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
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YELLOWSTONE RIVER
DRAINAGE

(Streams) cont.

West Fork Stillwater 22-664-1	1950	3.2 (15)	5.5 (11)	7.5 (3)	9.1 (3)	10.3 (2)	11.5 (1)
West Rosebud 22-6804-1	1948	3.1 (30)	5.7 (29)	8.0 (17)	10.3 (6)	11.9 (?)	14.1 (1)

Rainbow & Cutthroat Trout Hybrids

BIG HOLE RIVER
DRAINAGE

(Streams)

Big Hole River	1952	3.2 (5)					
Steel Creek 2-5950-1	1959	2.2 (8)	4.6 (4)				

BLACKFOOT RIVER
DRAINAGE

(Streams)

Belmont Creek 4-420-1	1950	2.8 (4)	3.3 (3)	5.2 (1)			
Placid Creek 4-4230-1	1959	3.7 (11)	6.1 (1)	7.9 (1)			

CLARK FORK
RIVER DRAINAGE
(Lakes)

Stewart Lake 6-7253-3 ?	1953	2.5 (9)	4.7 (8)	7.8 (8)	9.9 (8)	10.7 (2)	

(Streams)

Flint Creek 6-2261-1	1953	2.8 (8)	5.7 (5)	8.3 (2)	12.4 (1)		

FLATHEAD RIVER
DRAINAGE
(Streams)

Logan Creek 7-2500-1	1950	2.6 (57)	4.8 (39)	6.9 (10)			



Rainbow & Cutthroat Trout Hybrids cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
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GALLATIN RIVER
DRAINAGE
(Streams)

West Gallatin River

Section I	1951	3.5 (71)	7.4 (69)	11.5 (50)	15.1 (16)	16.7 (6)		
Section II	1951	3.9 (29)	7.3 (25)	10.6 (15)	14.5 (6)			
Section III	1951	3.5 (21)	6.9 (18)	11.0 (6)				

KOOTENAI RIVER
DRAINAGE
(Streams)

Pipe Creek 11-5160-1	1959	2.5 (6)	4.1 (1)					
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MILK RIVER
DRAINAGE
(Streams)

- Beaver Creek 15-360-1	1952	3.2 (5)	6.1 (3)	10.5 (1)				
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MISSOURI RIVER
DRAINAGE
(Streams)

Sheep Creek 17-6544-1	1951	4.5 (3)	5.1 (1)					
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Smith River 17-6832-1	1952	3.9 (7)	7.4 (5)	9.4 (4)	13.9 (1)			
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MUSSELSHELL RIVER
DRAINAGE
(Lakes)

- Holiday Lake 18-7860-1	1954	3.6 (25)	9.5 (25)	14.0 (4)	16.1 (1)			
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YELLOWSTONE RIVER
DRAINAGE
(Lakes)

- East Rosebud Lake 22-7714-3	1948	3.0 (5)	5.4 (5)	8.6 (4)	10.7 (2)			
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Rainbow & Cutthroat Trout Hybrids cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
YELLOWSTONE RIVER DRAINAGE (Streams)								
Boulder River	1948	3.1 (23)	6.5 (22)	10.5 (6)	13.8 (1)	16.3 (1)	18.1 (1)	
East Boulder River 22-2002-1	1950	2.7 (151)	5.0 (43)	6.7 (19)	7.6 (2)	8.5 (1)		
East Boulder River 22-2002-1	1958	2.3 (15)	4.5 (14)	6.5 (10)	8.5 (5)	10.9 (1)		
West Fork Stillwater River 22-6664-1	1948	3.6 (33)	6.3 (32)	8.6 (20)	10.8 (14)	11.9 (7)		
West Fork Stillwater River 22-6664-1	1950	3.5 (11)	6.1 (7)	8.2 (4)				
Brown Trout, <u>Salmo trutta</u>								
BEAVERHEAD RIVER DRAINAGE (Streams)								
Beaverhead River 1-500-1	1961	4.4 (14)	10.0 (10)	13.1 (2)	15.5 (2)			
Clear Creek 1-1360-1	1953	3.6 (35)	8.3 (22)	11.5 (5)				
Decker Creek 1-1967-0	1953	4.3 (21)	10.3 (16)	14.4 (10)	18.2 (4)	20.4 (2)		
Ruby River 1-6360-1	1953	3.8 (44)	8.5 (30)	12.0 (22)	14.6 (9)	15.8 (4)		
BIG HOLE RIVER DRAINAGE (Streams)								
Big Hole River 2-425-1	1952	4.0 (23)	10.7 (17)	15.8 (6)				
Big Hole River 2-425-1	1953	4.5 (3)	10.3 (3)	15.6 (2)				



Brown Trout, Salmo trutta cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
BLACKFOOT RIVER DRAINAGE (Lakes)								
Salmon Lake 4-7230-3								
1961	2.9 (6)	5.4 (6)	8.9 (6)	11.7 (5)	14.1 (3)	15.8 (2)		
CLARK FORK DRAINAGE (Lakes)								
Noxon Rapids Res. 5-9328-5								
1961	2.7 (21)	7.8 (21)	10.1 (21)	12.8 (16)	15.3 (2)			
(Streams)								
Clark Fork River 5-1456-1	3.3 (37)	7.0 (22)	12.1 (4)					
Little Blackfoot River 6-3591-1	2.8 (72)	6.1 (44)	8.8 (21)	11.0 (2)				
Rock Creek	3.5 (31)	8.5 (21)	12.9 (9)	*				
Rock Creek	4.3 (115)	9.9 (93)	13.0 (43)	15.6 (16)	17.1 (4)	17.9 (1)		
GALLATIN RIVER DRAINAGE (Streams)								
West Gallatin River	3.7 (102)	8.8 (97)	13.2 (71)	15.0 (28)	19.2 (1)			
West Gallatin River 9-6878-1	4.5 (11)	10.7 (10)	15.7 (8)	20.8 (2)				
West Gallatin River	3.9 (47)	9.0 (36)	13.7 (12)	16.0 (5)				
JEFFERSON RIVER DRAINAGE (Lakes)								
Willow Creek Res. (Harrison Lake) 10-9440-5								
1955	3.2 (55)	8.4 (55)	13.7 (53)	17.8 (28)	20.5 (1)			



Brown Trout, Salmo trutta cont.

YEAR Collected	I	II	III	IV	V	VI	VII	VIII
JEFFERSON RIVER DRAINAGE (Lakes) cont.								
Willow Creek Res. 1960 (Harrison Lake) 10-9440-5	3.4 (140)	8.3 (125)	13.0 (113)	15.7 (91)	17.3 (35)	19.1 (9)	22.9 (3)	24.0 (1)
Willow Creek Res. 1961 (Harrison Lake) 10-9440-5	3.0 (45)	7.6 (35)	11.0 (15)	14.4 (5)	17.7 (2)			
MADISON RIVER DRAINAGE (Lakes)								
Ennis Lake 13-7560-5	1950	3.7 (32)	10.1 (32)	14.6 (23)				
Hebgen Lake 13-7720-5	1949	3.5 (383)	8.9 (382)	13.2 (316)	15.1 (110)	16.8 (7)		
(Streams)								
Blaine Spring Cr. 1951 13-560-1		4.9 (17)	10.0 (5)					
Blaine Spring Cr. 1951 13-560-1		5.2 (35)	9.7 (14)	10.2 (2)				
Cherry Creek 13-1160-1	1953	3.4 (19)	7.3 (14)	10.5 (8)	13.1 (1)			
Cougar Creek 13-1360-1	1951	3.6 (45)	8.0 (3)	15.1 (1)				
Madison River 13-3440-1	1948	4.0 (10)	9.5 (9)	14.8 (6)	16.5 (2)			
Madison River 13-3440-1	1948	5.2 (4)	10.3 (4)	14.4 (4)	17.0 (4)			
Madison River 13-3440-1	1950	4.4 (163)	8.7 (144)	13.6 (77)	16.6 (37)	17.8 (6)		
Odell Creek 13-4400-1	1951	4.2 (89)	10.0 (39)	14.0 (21)	16.9 (5)			
South Fork Madison River 13-5400-1	1950	3.0 (53)	9.1 (53)	14.1 (15)				



Brown Trout, Salmo trutta cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
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MISSOURI RIVER
DRAINAGE
(Lakes)

Canyon Ferry Res. 1958 17-8832-5	4.2 (67)	10.4 (57)	14.3 (35)	17.2 (34)	20.7 (9)	23.6 (3)		
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(Streams)

Big Spring Creek 1960 16-300-1	5.8 (8)	16.0 (1)						
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Hound Creek 1960 17-3600-1	3.8 (46)	9.0 (17)	13.4 (6)	18.4 (1)				
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Missouri River 1948 (Holter Dam) 17-4896-1	4.1 (39)	9.0 (28)	12.8 (11)	16.0 (3)				
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Frickley Pear Cr. 1949 17-6016-1	3.5 (570)	7.8 (269)	11.4 (203)	14.5 (61)	17.1 (18)	20.0 (6)	20.1 (2)	
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Frickley Pear Cr. 1950-51 17-6016-1	3.8 (908)	7.7 (375)	11.1 (229)	13.7 (80)	16.5 (19)	20.2 (5)	22.2 (1)	
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Smith River 1960 17-6832-1	3.7 (23)	8.9 (7)						
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MUSSELSHELL RIVER
DRAINAGE
(Streams)

Big Elk Creek 1951 18-360-1	3.3 (118)	7.6 (51)	11.2 (16)	16.5 (1)	18.3 (1)			
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Musselshell River 1960 18-4350-1	3.4 (50)	8.0 (42)	12.4 (11)	15.7 (4)				
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South Fork Musselshell 18-5670-1	4.1 (6)	8.8 (1)						
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YELLOWSTONE RIVER
DRAINAGE
(Streams)

Bluewater Creek 1950 22-714-1	3.6 (23)	6.0 (21)	8.5 (17)	12.4 (2)	17.7 (1)			
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Brown Trout, Salmo trutta cont.

	Year Collected	I	II	III	IV	V	VI	VII	VIII
YELLOWSTONE RIVER DRAINAGE (Streams)									
Bluewater Creek 22-714-1	1951	2.7 (7)	6.8 (7)	9.1 (2)					
Bluewater Creek 22-714-1	1952	3.6 (47)	6.5 (34)						
-- Bluewater Creek 22-714-1	1961	3.8 (101)	6.6 (43)	9.7 (17)	14.2 (4)	15.7 (1)	17.3 (1)		
Boulder River	1948	3.6 (37)	6.9 (33)	11.8 (11)	14.9 (5)	16.6 (2)			
-- East Boulder River 22-2002-1	1950	2.7 (94)	5.2 (58)	7.8 (30)	9.6 (7)				
-- East Risttail Cr. 22-2058-1	1948	3.5 (7)	7.2 (7)	9.7 (3)					
-- East Rosebud Cr. 22-2254-1	1948	3.7 (19)	6.9 (19)	9.4 (5)	13.4 (1)				
Little Bighorn River 22-3668-1		3.3 (18)	6.9 (5)	8.0 (1)					
Rock Creek	1950	3.9 (17)	8.0 (16)	9.8 (9)	14.5 (1)				
Rock Creek 22-4942-1	1952	3.4 (68)	6.8 (39)	10.9 (6)	14.0 (2)	13.2 (1)			
Shields River 22-5362-1	1950	3.1 (176)	7.2 (95)	10.8 (61)	13.1 (22)				
Stillwater River	1948	3.6 (51)	6.9 (47)	10.0 (24)	12.9 (8)				
Tongue River 21-1200-1	1955	3.3 (20)	7.4 (20)	10.6 (12)	14.9 (6)	18.6 (4)	20.5 (1)		
-- Upper Deer Creek 22-6454-1	1953	3.3 (27)	6.7 (23)	9.0 (3)					
-- West Boulder River 22-6552-1	1948	3.2 (42)	5.7 (38)	8.0 (20)	10.0 (2)				



Brown Trout, Salmo trutta cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
YELLOWSTONE RIVER DRAINAGE (Streams) cont.								
West Boulder River 22-6552-1	1958	2.6 (65)	5.7 (28)	8.9 (12)	15.6 (.)	16.1 (2)		
West Fork Stillwater River 22-664-1	1948	3.0 (9)	6.0 (9)	9.1 (8)	12.1 (3)	12.1 (1)		
West Fork Stillwater River 22-6664-1	1950	3.2 (14)	6.1 (12)	8.8 (11)	10.1 (4)	11.5 (1)	12.6 (1)	
West Fork Stillwater River 22-6664-1	1952	3.5 (44)	6.7 (37)	9.7 (15)	12.2 (4)	15.0 (1)		
West Rosebud Cr. 22-6804-1	1948	2.9 (51)	5.8 (51)	8.4 (43)	10.9 (13)	16.6 (3)	17.9 (1)	
Yellowstone River 22-7070-1	1950	4.1 (7)	9.4 (7)	13.7 (5)	17.2 (2)			

Brook Trout, Salvelinus fontinalis

BEAVERHEAD RIVER DRAINAGE (Lakes)								
Culver Pond (Widow's Pool) 1-8680-5	1955	4.7 (89)	10.0 (48)	14.4 (21)	17.4 (9)	20.6 (1)		
Culver Pond 1-2680-5	1961	3.7 (24)	6.6 (17)	10.6 (5)				
McDonald Pond 1-9100-7	1955	5.1 (45)	9.8 (34)	13.3 (13)	14.9 (2)			
Reservoir Lake 1-9380-5	1959	4.3 (58)	7.2 (41)	8.9 (4)				
(Streams)								
Bloody Dick Creek 1-740-1	1953	2.6 (42)	4.5 (37)	6.0 (9)	7.5 (1)			
Bloody Dick Creek 1-740-1	1959	2.3 (38)	4.3 (27)	5.8 (9)				



Brook Trout, Salvelinus fontinalis cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
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BEAVERHEAD RIVER

DRAINAGE

(Streams) cont.

Grasshopper Creek 1-3100-1	1952	4.2 (17)	7.2 (6)					
Taylor Creek 1-7600-1	1952	3.7 (31)	6.4 (30)	7.9 (6)				

BIG HOLE RIVER

DRAINAGE

(Lakes)

Browne Lake 2-7525-3	1959	2.4 (32)	5.2 (32)	7.8 (17)	9.5 (2)			
Miner Lake 2-8525-3	1959	3.2 (25)	7.1 (25)	9.8 (10)				
Mussingbrod Lake 2-8625-3	1959	2.7 (8)	6.4 (8)	9.6 (5)	12.7 (2)			
Pintlar Lake 2-8800-3	1959	3.1 (12)	6.2 (12)	8.0 (5)				
Twin Lake 2-9425-3	1959	3.2 (16)	6.5 (16)	9.0 (7)				

BIG HOLE RIVER

DRAINAGE

(Streams)

Big Hole River Section I 2-425-1	1959	2.9 (48)	5.4 (25)	7.7 (10)	9.4 (2)			
Section II 2-450-1	1959	2.2 (58)	4.2 (35)	6.5 (17)				
Deep Creek 2-1625-1	1959	3.2 (19)	5.9 (17)	8.7 (2)	11.6 (1)			
Joseph Creek 2-3025-1	1959	2.7 (36)	5.0 (16)					
LaMarche Creek 2-3175-1	1959	2.7 (23)	4.9 (15)	7.9 (6)				
Miner Creek (Lower) 2-3950-1	1959	3.1 (40)	5.8 (28)	8.4 (7)				



Brook Trout, Salvelinus fontinalis cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
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BIG HOLE RIVER
DRAINAGE

(Streams) cont.

Miner Creek (Upper) 2-3950-1	1959	2.1 (11)	4.3 (11)	7.3 (2)				
North Fork Big Hole River 2-4275-1	1959	3.6 (19)	6.6 (8)	9.6 (2)	12.6 (1)			
Pattengail Creek 2-4500-1	1959	3.7 (16)	4.6 (3)					
Pistlar Creek 2-4550-1	1959	3.2 (6)	6.5 (5)	9.3 (2)				
Ruby Creek 2-5000-1	1959	3.0 (30)	5.9 (14)	8.6 (3)				
Steal Creek 2-5950-1	1959	4.0 (17)	7.8 (7)	11.1 (1)				
Trail Creek 2-6450-1	1959	2.9 (52)	5.6 (32)	7.3 (10)	9.4 (2)			
Trail Creek 2-6450-1	1959	3.3 (6)	6.3 (3)	9.2 (1)				
Trail Creek 2-6450-1	1959	3.5 (16)	6.0 (2)					
Wise River (Above Moose Cr.) 2-7025-1	1959	3.1 (12)	5.7 (3)	8.6 (1)				
Wise River (Below Wyman Cr.) 2-7025-1	1959	3.8 (8)	6.5 (2)					

BITTERROOT RIVER
DRAINAGE

(Streams)

Lolo Creek 3-3475-1	1950	4.3 (3)	7.4 (3)					
Miller Creek 3-3975-1	1961	3.1 (15)	6.3 (5)					



Brook Trout, Salvelinus fontinalis cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
BITTERROOT RIVER DRAINAGE (Streams) cont.								
Tin Cup Creek 3-6/25-1 1959								
	3.6 (15)	5.9 (2)						
BLACKFOOT RIVER DRAINAGE (Lakes)								
Placid Lake 4-7140-3	1955	2.8 (15)	5.5 (15)	8.4 (15)	11.1 (13)	14.5 (6)		
Placid Lake 4-7140-3	1957	2.9 (32)	5.2 (32)	7.2 (23)	8.8 (4)	10.2 (1)		
(Streams)								
Finley Creek 4-2370-1	1961	3.3 (10)	4.4 (1)					
Placid Creek 4-4230-1	1950	2.8 (293)	5.0 (172)	8.8 (36)	11.4 (8)	16.0 (4)		
CLARK FORK RIVER DRAINAGE (Lakes)								
Diamond Lake 5-8720-3	1961	2.7 (75)	5.8 (75)	7.5 (11)				
East Fork Res. 6-7695-5	1960	3.0 (8)	6.1 (8)	8.3 (5)				
Echo Lake 6-7733-3	1961	3.0 (13)	5.9 (13)	8.4 (3)	11.9 (1)	14.5 (1)	16.0 (1)	17.4 (1)
Georgetown Lake 6-7961-5	1950	5.5 (6)	10.2 (6)	14.1 (3)	15.4 (1)			
Georgetown Lake 6-7961-5	1958	4.0 (12)	9.9 (12)	14.6 (3)				
Georgetown Lake 6-7961-5	1960	3.2 (51)	7.2 (51)	11.2 (30)	15.1 (2)			
Georgetown Lake 6-7961-5	1961	3.1 (9)	5.1 (9)	10.0 (7)				



Brook Trout, Salvelinus fontinalis cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
CLARK FORK RIVER DRAINAGE (Lakes)								
Lower Thompson Lake 5-9152-3								
1956	3.5 (9)	6.2 (7)	9.8 (5)					
Moore Lake 5-9264-3	1958	3.7 (46)	7.3 (27)	9.8 (4)				
Silver Lake 5-9552-3	1958	2.4 (55)	5.5 (55)	7.7 (24)				
Silver Lake 5-9552-3	1961	2.9 (29)	5.9 (28)	7.2 (5)	8.5 (1)			
(Streams)								
Flint Creek	1953	4.0 (6)	6.7 (3)					
Lost Creek 6-3705-1	1959	3.0 (21)	5.7 (13)	7.2 (1)				
Mill Creek 5-4800-1	1959	3.3 (23)	5.4 (6)	.				
Prospect Creek 5-5648-1	1960	2.8 (55)	4.4 (23)	6.0 (5)				
Ranch Creek 6-5111-1	1959	3.0 (8)	5.7 (8)	8.0 (4)				
Rock Creek	1948	4.2 (22)	6.5 (15)					
Rock Creek	1959	4.0 (62)	6.8 (26)	10.2 (5)				
Twelve Mile Creek 5-7488-1	1961	2.9 (10)	5.0 (4)	7.4 (2)				
Warm Springs Cr. 6-6878-1	1959	3.1 (10)	5.2 (6)					
Willow Creek 6-7144-1	1959	4.5 (15)	6.6 (6)					



Brock Trout, Salvelinus fontinalis cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
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FLATHEAD RIVER
DRAINAGE
(Lakes)

Lake of the Woods 1961 7-7180-3	2.4 (7)	5.1 (7)	7.2 (3)					
Lost Lake 7-7470-3	1953	4.2 (48)	6.9 (17)	9.1 (1)				
Spoon Lake 8-9720-3	1953	3.8 (15)	6.7 (15)	8.8 (3)				

(Streams)

Little Bitterroot 1950 River 7-2460-1	3.4 (7)	5.7 (1)						
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Little Bitterroot 1951 River 7-2460-1	3.2 (6)	6.4 (..)	10.4 (1)					
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Logan Creek	1950	2.7 (15)	4.9 (11)	6.7 (1)				
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Martin Creek	1960	3.3 (14)	5.6 (1)					
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Nine Mile Creek 8-5040-1	1960	2.8 (20)	5.2 (13)	7.8 (3)				
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Postal Creek	1960	3.3 (8)	6.1 (7)	8.2 (3)				
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Smith Creek 7-4000-1	1951	3.9 (57)	7.3 (53)	10.4 (17)				
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GALLATIN RIVER
DRAINAGE
(Streams)

West Gallatin River Section I 9-6878-1	1948	4.6 (12)	8.5 (8)					
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KOOTENAI RIVER
DRAINAGE
(Lakes)

Killbrennan Lake 11-8640-3	1956	2.9 (47)	5.6 (44)	8.2 (18)	10.6 (2)			
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Brook Trout, Salvelinus fontinalis cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
KOOTENAI RIVER DRAINAGE (Lakes) cont.								
Spur Lake 1956								
" " " " (18)								
(Streams)								
Cripple Horse Cr. 1952	4.0							
11-1520-1	(7)							
Dodge Creek 1952	4.2							
11-2120-1	(6)							
Five Mile Creek 1952	3.7							
11-2120-1	(5)							
O'Brien Creek 1956	3.1							
11-420-1	(256)	(94)						
Pinkham Creek 1951	4.2							
11-5140-1	(81)	(6)						
Mintham Creek 1956	2.5							
11-5140-1	(4)	(22)	(5)					
MADISON RIVER DRAINAGE (Streams)								
Cougar Creek 1951	3.9							
13-1360-1	(14)	(2)						
MILK RIVER DRAINAGE (Lakes)								
Ridge Reservoir 1960	4.5							
15-0930-7	(15)	(14)	(1)	(1)	(1)			
(Streams)								
Bearer Creek 1952	3.9							
15-2130-1	(13)	(14)	(2)	(1)				
Bearer Creek 1957	3.1							
15-2830-1	(30)	(19)	(5)	(2)				
Big Bend Creek 1958	2.7							
15-4450-1	(9)	(7)	(2)	(1)				



Brook Trout, Salvelinus fontinalis cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
MILK RIVER DRAINAGE (Streams) cont.								
Clear Creek 15-960-1								
	1957	3.3 (107)	5.9 (44)	8.1 (4)				
MISSOURI RIVER DRAINAGE (Lakes)								
Upper and Lower Tizer Lakes 17-5696-3	1952	3.2 (48)	5.3 (24)	6.9 (5)	7.4 (1)			
(Streams)								
Eagle Creek 16-1320-1	1958	3.5 (22)	6.2 (8)	9.2 (1)	11.0 (1)			
Elkhorn Creek 17-2624-1	1952	3.9 (28)	7.2 (26)	9.2 (3)				
Newlan Creek 17-5200-1	1953	4.4 (7)	6.3 (2)					
Prickley Pear Cr. 17-6016-1	1955-51	4.1 (103)	7.0 (34)	9.6 (5)				
Running Wolf Cr. 16-3110-1	1951	4.4 (31)	7.5 (9)	-				
Running Wolf Cr. 16-3160-1	1961	2.9 (25)	5.5 (11)					
Sheep Creek 17-6544-1	1951	4.4 (82)	6.4 (8)	8.0 (1)	12.2 (1)			
Skonkin Creek 17-6656-1	1960	3.4 (91)	6.0 (18)	7.1 (1)				
Wolf Creek 16-4180-1	1958	3.0 (32)	5.8 (18)	8.6 (3)				
W.J.C. Creek 16-4120-1	1961	3.8 (6)	9.7 (2)					



Brook Trout, Salvelinus fontinalis cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
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MUSKELSHELL RIVER

DRAINAGE

(Lakes)

Holiday Lake 1954-58 4.3 (71) 8.8 (57) 12.1 (13)

Holiday Lake 1960 5.0 (33) 8.7 (18) 10.8 (2)

Holiday Lake 1961 4.1 (58) 8.4 (57) 11.0 (37)

(Streams)

Allabaugh Creek 1950 2.8 (76) 5.1 (13)

Big Elk Creek 1951 4.1 (64) 6.2 (16)

SUN RIVER

DRAINAGE

(Lakes)

Willow Creek Res. 1959 3.0 (2) 6.3 (2) 9.2 (2)

(Streams)

West Fork Sun River 1960 2.7 (11) 5.3 (11) 7.3 (3)

YELLOWSTONE RIVER

DRAINAGE

(Lakes)

Crescent Lake 1949 2.5 (6) 5.3 (6) 7.5 (4) 9.0 (1)

Crescent Lake 1959 3.1 (11) 5.9 (11) 8.0 (9)

Crow Lake 1959 2.7 (116) 5.5 (110) 7.8 (107) 9.2 (28)

Gertrude Lake 1949 3.6 (9) 6.1 (9) 8.2 (5)



Brook Trout, Salvelinus fontinalis cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
YELLOWSTONE RIVER DRAINAGE (lakes) cont.								
Glacier Reservoir 1959								
22-798C-3	3.2 (57)	5.9 (46)	8.1 (40)	10.1 (32)	11.9 (4)	14.2 (1)		
Hellroaring Lake 1949	3.9 (40)	7.2 (38)	9.5 (21)					
Hellroaring Lake 1949 No. 5 22-8064-3	3.6 (10)	7.5 (9)	10.6 (4)					
Hellroaring Lake 1952 No. 1 22-8064-3	3.1 (16)	6.7 (10)	9.7 (5)					
Kersey Lake 22-8274-3	1959	2.8 (121)	5.2 (101)	7.2 (65)	8.6 (19)			
Lost Lake 22-8512-3	1949	3.3 (15)	6.4 (12)	8.4 (5)				
Round Lake 22-9041-3	1959	2.7 (60)	6.7 (38)	9.8 (12)	12.0 (8)			
Russell Lake 22-9072-3	1959	2.3 (133)	5.2 (101)	7.7 (60)	10.2 (6)			
September Morn Lake 22-9128-3	1949	3.4 (38)	6.4 (37)	8.6 (30)	9.8 (4)			
Shelf Lake 22-9156-3	1949	2.9 (12)	5.6 (12)	7.7 (12)	11.2 (1)			
Ship Lake 22-9170-3	1949	3.3 (15)	5.9 (15)	7.6 (13)				
Ship Lake 22-9170-3	1959	3.1 (92)	5.3 (86)	7.3 (65)	9.2 (26)			
Slough Lake 22-9254-3	1951	5.3 (75)						
Slide Rock Lake 22-9240-3	1949	3.4 (28)	6.0 (28)	8.6 (25)				



Brook Trout, Salvelinus fontinalis cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
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YELLOWSTONE RIVER
DRAINAGE

(Lakes) cont.

Timberline Lake 22-9478-3	1949	5.6 (26)	6.1 (22)	7.8 (9)				
Timberline Lake 22-9478-3	1959	2.0 (76)	4.5 (61)	6.5 (53)	7.9 (11)			

(Streams)

Boulder River	1948	4.2 (14)	6.7 (11)					
East Fishtail Cr. 22-2058-1	1948	3.9 (5)	7.3 (4)	9.2 (1)				
Sage Creek 22-5110-1	1950	3.8 (23)	6.0 (17)	8.7 (5)				
West Fork Rock Creek 22-6650-1	1952	3.0 (8)	6.0 (8)	9.0 (8)	10.6 (2)			

Dolly Varden, Salvelinus malma

BITTERROOT RIVER
DRAINAGE

(Streams)

Meadow Creek 3-3800-1	1952	3.2 (42)	4.6 (20)	6.2 (1)				
South Fork Skalkaho Creek 3-5850-1	1952	3.1 (6)	5.1 (5)	7.4 (2)				

BLACKFOOT RIVER
DRAINAGE
(Lakes)

Alva Lake 4-6120-3	1955	2.2 (12)	5.3 (12)	7.8 (12)	10.7 (12)	13.2 (4)	16.5 (1)	
Inez Lake 4-6720-3	1955	3.0 (14)	5.7 (14)	8.1 (14)	10.8 (13)	13.3 (7)	16.2 (2)	
Placid Lake 4-7140-3	1955	2.9 (25)	5.5 (25)	8.0 (25)	11.8 (25)	12.1 (15)	18.2 (2)	23.0 (1)



Dolly Varden, Salvelinus malma cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
BLACKFOOT RIVER DRAINAGE								
(Lakes) cont.								
Placid Lake 4-7140-3	1956	2.6 (24)	5.1 (24)	7.6 (24)	10.7 (22)	14.5 (12)	18.9 (6)	23.1 (3)
Salmon Lake 4-7230-3	1948	4.4 (7)	7.5 (7)	10.9 (5)				
Salmon Lake 4-7230-3	1955	2.5 (8)	4.7 (8)	6.9 (8)	9.5 (8)	13.7 (4)	18.5 (3)	21.8 (3)
Salmon Lake 4-7230-3	1961	3.0 (15)	5.9 (15)	9.2 (14)	12.5 (10)	17.3 (1)		21.2 (1)
Seeley Lake 4-7260-3	1948	4.3 (7)	9.2 (7)	12.0 (1)				
Seeley Lake 4-7260-3	1955	3.0 (35)	5.2 (35)	8.0 (35)	11.1 (31)	12.2 (14)	18.5 (2)	
(Streams)								
Belmont Creek 4-420-1	1950	6.2 (4)						
Clearwater River 4-1290-1	1957	2.4 (31)	4.7 (23)	7.0 (9)	9.8 (1)	11.5 (1)	14.4 (1)	16.7 (1)
CLARK FORK COLUMBIA RIVER DRAINAGE								
(Lakes)								
East Fork Res. 6-7695-5	1960	3.1 (34)	6.9 (34)	10.6 (25)	14.7 (4)			
(Streams)								
Boulder Creek 6-646-1	1961	2.8 (34)	5.6 (17)					
Ranch Creek 6-5111-1	1959	2.6 (12)	4.9 (12)	7.8 (6)	13.1 (2)			
Rock Creek	1958	3.4 (35)	6.7 (35)	9.6 (32)	12.9 (5)			
Rock Creek	1959	3.7 (54)	6.8 (40)	10.2 (26)	14.1 (6)	16.6 (1)		



Lolly Varden, Salvelinus malma cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
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CLARK FORK
COLUMBIA RIVER
DRAINAGE

(Streams) cont.

Rock Creek	1960	3.1 (23)	6.2 (23)	9.0 (16)				
Trout Creek 5-7408-1	1957	2.8 (17)	5.8 (12)	9.0 (1)				
Twelve Mile Creek 5-7488-1	1961	2.3 (6)	4.2 (3)	6.4 (2)				

FLATHEAD RIVER
DRAINAGE
(Lakes)

Doctor Lake 8-8520-3	1960	3.0 (6)	5.4 (6)	10.0 (6)	13.3 (6)	18.0 (2)		
Frozen Lake 8-8580-3	1957	2.4 (41)	5.3 (41)	8.4 (37)	11.5 (15)	14.1 (11)	16.8 (1)	
Hungry Horse Res. 8-8860-5	1958	2.6 (152)	5.4 (152)	8.7 (138)	12.7 (1)	17.1 (40)	20.6 (19)	23.3 (1)
Hungry Horse Res. 8-C860-5	1960	2.2 (39)	5.6 (39)	9.4 (38)	13.9 (23)	16.3 (7)		
Hungry Horse Res. 8-8860-5	1961	2.8 (214)	5.5 (214)	8.7 (194)	13.0 (133)	17.5 (91)	23.3 (31)	27.6 (5)
Upper Whitefish Lake 7-9460-3	1957	2.9 (17)	5.8 (17)	8.5 (17)	10.7 (11)	14.3 (2)	16.3 (1)	

(Streams)

Bear Creek 8-540-1	1952	3.4 (24)	5.6 (6)					
Moose Creek 8-4880-1	1952	3.1 (21)	4.0 (4)					
South Fork Flathead River 8-6660-1	1952	3.6 (15)	5.5 (10)	7.1 (3)				
Upper Jocko River 7-2260-1	1956	2.8 (16)	5.6 (16)	7.6 (8)	8.7 (1)			



Dolly Varden, Salvelinus malma cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
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KOOTENAI RIVER
DRAINAGE
(Streams)

Flower Creek 11-2440-1	1959	2.1 (8)	3.8 (7)	5.2 (5)				
Graves Creek 11-2720-1	1952	4.0 (8)						
O'Brien Creek 11-4820-1	1950	4.0 (4)	7.2 (1)	11.2 (1)	15.9 (1)	19.2 (1)		

Lake Trout, Salvelinus namaycush

BIG HOLE RIVER
DRAINAGE
(Lakes)

Twin Lake 2-9425-3	1959	2.8 (15)	5.8 (15)	10.4 (12)	13.9 (5)	19.9 (2)	25.2 (1)	
Whitefish Lake 7-9540-3	1961	3.0 (17)	5.8 (17)	9.4 (17)	14.3 (17)	20.0 (17)	25.0 (17)	29.4 (17)

IX
34.4
(4)

Artic Grayling, Thymallus arcticus

BEAVERHEAD RIVER
DRAINAGE
(Streams)

Battle Creek	1950	5.4 (15)	11.3 (15)	14.1 (12)				
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BIG HOLE RIVER
DRAINAGE
(Lakes)

Miner Lake 2-8525-3	1959	2.6 (6)	6.7 (6)	10.0 (6)	11.5 (2)	12.7 (1)		
Mussigbrod Lake 2-8625-3	1957	3.7 (43)	7.9 (32)	10.0 (12)	10.9 (2)	12.3 (1)		
Mussigbrod Lake 2-8625-3	1959	3.5 (9)	8.0 (8)	10.3 (8)				



Artic Grayling. Thymallus arcticus cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
CLARK FORK RIVER DRAINAGE (Lakes)								
Georgetown Lake 6-7961-5								
1958	3.4 (32)	9.4 (27)						
FLATHEAD RIVER DRAINAGE (Streams)								
Ashley Creek	1953	5.2 (11)	9.8 (11)	12.1 (11)	13.7 (10)	14.2 (1)		
MADISON RIVER DRAINAGE (Lakes)								
Ennis Lake 13-7560-5	1950	5.6 (14)	12.2 (8)					
West Fork Beaver Creek Lake 13-6520-	1951	4.0 (4)	8.2 (4)	11.0 (4)	12.6 (4)	13.0 (1)	13.9 (1)	

Hiodontidae

Goldeye, Hiodon alosoides

MARIAS RIVER DRAINAGE (Streams)	1961	3.3 (17)	6.9 (17)	9.7 (17)	10.9 (16)	11.5 (12)	12.2 (1)	
MISSOURI RIVER DRAINAGE (Lakes)								
Fort Peck Res. 16-5140-5	1949	4.6 (312)	8.8 (312)	11.2 (281)	12.3 (144)	13.3 (45)	14.1 (8)	
Fort Peck Res. 16-5140-5	1950	4.5 (12)	8.7 (11)	11.1 (8)	12.2 (3)	12.8 (1)		



ASOC ID:AE

Northern Pike, Esox lucius

Peameuth. *Mylocheilus caurinus*

BLACKFOOT RIVER
DRAINAGE
(Lakes)

Placid Lake
4-71463

Placid Lake 1955 2.6 4.6 6.7 8.3 9.6 10.6 11.5 12.6
 4-71463 (300) (300) (294) (200) (176) (125) (71) (12)
 ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
 IX
 13.5
 (1)



Peamount, Mylocheilus caurinus cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
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CLARK FORK RIVER

DRAINAGE

(Lakes)

Clarks Fork River 1958

2.4	4.6	6.1	8.4
(36)	(22)	(6)	(3)

Northern Squawfish, Ptychocheilus oregonensis

BLACKFOOT RIVER

DRAINAGE

(Lakes)

Alva Lake

4-6120-3	1955	2.1 (267)	3.3 (267)	4.5 (267)	5.9 (267)	7.2 (267)	8.4 (233)	9.5 (180)	10.5 (113)
						IX 11.5 (73)	X 12.3 (38)	XI 13.4 (16)	XII 14.4 (9)

CLARK FORK RIVER

DRAINAGE

(Lakes)

Lower Thompson

Lake	1952	1.8 (17)	3.6 (17)	5.0 (17)	5.4 (17)	8.1 (12)	8.6 (9)	11.4 (7)
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5-9152-3

(Streams)

Boiling Springs

5-736-1	1952	2.8 (6)	5.5 (6)	7.6 (6)	9.3 (5)	10.8 (5)	12.2 (5)	13.6 (5)
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Clark Fork River

1958	1.7 (106)	3.3 (80)	4.9 (5?)	6.7 (22)	9.4 (16)	9.9 (13)	11.5 (9)	12.8 (5)
					IX 14.7 (3)	X 16.1 (3)	XI 17.4 (1)	XII 18.4 (1)

CATOSTOMIDAE

Longnose Sucker, Catostomus catostomus

BLACKFOOT RIVER

DRAINAGE

(Lakes)

Copper Lake

4-6330-3	1957	1.5 (49)	3.5 (49)	6.3 (49)	9.5 (49)	11.5 (32)	14.0 (23)	15.8 (12)	17.1 (5)
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Longnose Sucker, Catostomus catostomus cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
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BLACKFOOT RIVER

DRAINAGE

(Lakes) cont.

Placid Lake 4-7140-3	1951	2.0 (16)	5.4 (16)	8.2 (17)	10.6 (9)	12.8 (6)	12.7 (2)
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CLARK FORK RIVER

DRAINAGE

(Streams)

Georgetown Lake 6-7961-5	1950	1.0 (29)	3.1 (29)	6.3 (28)	8.8 (13)	10.4 (5)	
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MARIAS RIVER

DRAINAGE

(Streams)

Marias River 14-3240-2	1961	1.4 (45)	3.7 (42)	6.7 (38)	9.2 (31)	11.4 (15)	13.4 (9)	12.3 (4)	14.6 (1)
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MISSOURI RIVER

DRAINAGE

(Lakes)

Canyon Ferry Res. 17-832-5	1958	2.7 (42)	5.7 (42)	8.9 (33)	10.4 (19)	10.7 (2)	
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YELLOWSTONE RIVER

DRAINAGE

(Streams)

Bluewater Creek 22-714-1	1961	1.7 (107)	4.1 (65)	7.3 (46)	10.6 (27)	12.6 (12)	16.0 (2)
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White Sucker, Catostomus couesii

MARSH RIVER

DRAINAGE

(Lakes)

Bynum Reservoir 14-7020-5	1961	1.7 (51)	5.0 (51)	9.1 (48)	12.4 (34)	14.5 (13)	15.2 (7)	15.9 (2)
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Mission Lake (Lower) 14-2030-3	1951	1.6 (32)	5.5 (32)	10.8 (26)	13.8 (21)	15.3 (3)	16.4 (1)	16.9 (1)
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Tiber Reservoir 14-9740-5	1958	1.0 (17)	4.7 (32)					
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W.L.⁴⁺ Sucker, Catostomus commersoni cont.

	Year Collected	I	II	III	IV	V	VI	VII	VIII
MARLIS RIVER DRAINAGE (Streams)									
Marles River 1961 16-3240-2		2.6 (32)	6.9 (52)	9.6 (23)	11.6 (11)	13.4 (2)			
MISSOURI RIVER DRAINAGE (Lakes)									
Canyon Ferry Res. 1958		1.9 (112)	5.2 (108)	8.5 (100)	10.8 (81)	12.9 (42)	14.3 (6)	14.9 (5)	16.4 (3)
Kellenbeck Res. 1960 16-6200-8		1.2 (10)	3.9 (10)	7.9 (9)	10.7 (9)	11.9 (3)			
(Streams)									
Poplar River 1961 16-2820-2		1.6 (18)	3.1 (14)	4.7 (11)	7.0 (3)	10.7 (2)	10.5 (1)		
MUSSELSHELL RIVER DRAINAGE (Lakes)									
Martizedale Res. 1951 18-8380-5		2.4 (10)	6.0 (10)	9.7 (10)	12.1 (9)	13.3 (6)			
YELLOWSTONE RIVER DRAINAGE (Streams)									
Bluewater Creek 1961 22-714-1		1.8 (56)	4.6 (17)	6.5 (8)	8.8 (6)	9.9 (3)	11.6 (1)		
Large-scale Sucker, <u>Catostomus macrocheilus</u>									
CLARK FORK RIVER DRAINAGE (Streams)									
Clark Fork River 1950		1.8 (205)	3.0 (145)	5.4 (93)	7.4 (73)	10.3 (68)	12.9 (44)	15.7 (37)	16.8 (12)



Northern Redhorse, *Moxostoma macrostomum*

GENTEARCHIDAE

Pumpkinseed, *Lepomis gibbosus*

**FLATHEAD RIVER
DRAINAGE
(Lakes)**

Bailey Lake 8-8040-3	1949	0.6 (21)	1.6 (21)	2.2 (21)	2.6 (21)	2.8 (21)	3.0 (15)	3.3 (14)
-Blanchard Lake 7-5400-4	1961	0.3 (6)	1.6 (6)	2.5 (6)	4.3 (3)	6.0 (2)	5.8 (1)	6.4 (1)

IX
7.7
(1)

**BLACKFOOT RIVER
DRAINAGE
(Lakes)**

Bluegill, Lepomis macrochirus - Probably misidentification
of Pumpkinsacks

Salmon Lake 4-7230-3	1948	1.9 (19)	3.2 (19)	4.4 (14)	5.0 (10)	5.7 (7)	5.8 (1)	
Seeley Lake 4-7260-3	1948	1.7 (23)	2.8 (23)	3.9 (21)	5.0 (20)	6.2 (20)	6.9 (11)	7.7 (5)



Bluegill, Lepomis macrochirus cont.

	Year Collected	I	II	III	IV	V	VI	VII	VIII
MADISON RIVER DRAINAGE (Lakes)									
East Three Forks Pond 13-8650-7	1957	1.7 (67)	2.9 (39)	4.0 (35)	4.7 (29)	5.2 (14)	5.6 (2)	6.6 (1)	
Middle Three Forks Pond 13-8640-7	1957	0.8 (25)	1.8 (25)	2.8 (22)	3.8 (21)	4.7 (14)	5.3 (10)	6.0 (4)	6.9 (1)
West Three Forks Pond 13-8640-7	1957	0.8 (27)	2.2 (20)	4.8 (5)	5.7 (2)				
MISSOURI RIVER DRAINAGE (Lakes)									
Jacobson Res. 16-6060-8	1961	1.0 (10)	2.8 (10)	4.0 (10)	5.4 (10)	6.0 (10)	6.6 (10)		
Stafford Lake 16-8380-7	1960	1.0 (16)	2.0 (16)	4.0 (16)	5.2 (16)	6.0 (13)	7.0 (1)		
YELLOWSTONE RIVER DRAINAGE (Lakes)									
Killens Reservoir 21-4624-8	1960	1.4 (14)	2.9 (14)	4.1 (14)	5.3 (14)	6.0 (13)	6.4 (4)		
Largemouth Bass, <u>Micropterus salmoides</u>									
FLATHEAD RIVER DRAINAGE (Lakes)									
Kicking Horse Reservoir 7-7020-6	1960	2.0 (17)	5.2 (17)	6.4 (14)	7.5 (3)				
Nine Pipe Res. 7-8100-6	1960	3.1 (107)	7.1 (107)	10.9 (107)	12.6 (84)	13.8 (62)	14.7 (30)	15.8 (25)	16.6 (16)

IX **X** **XI**
 17.0 17.5 17.9
 (3) (3) (1)



Largemouth Bass, Micropterus salmoides cont.

	Year Collected	I	II	III	IV	V	VI	VII	VIII
MADISON RIVER DRAINAGE (Lakes)									
East Three Forks Pond 13-8640-7	1957	2.0 (52)	3.7 (40)	5.6 (34)	7.7 (28)	9.3 (20)	10.9 (17)	12.3 (15)	13.2 (12)
								IX 14.0 (6)	X 13.8 (3)
Middle Three Forks Pond 13-8640-7	1957	1.8 (61)	3.7 (54)	5.5 (51)	7.4 (47)	10.0 (28)	11.7 (23)	13.4 (15)	14.3 (10)
									IX 15.2 (5)
West Three Forks Pond 13-8640-7	1959	2.0 (45)	4.2 (31)	6.2 (27)	8.5 (20)	10.4 (17)	12.0 (12)	13.3 (8)	14.3 (6)
									IX 15.8 (1)
MISSOURI RIVER DRAINAGE (Lakes)									
Latka Reservoir 16-6520-8	1961	1.8 (42)	4.8 (42)						
Tolksdorf Res. 16-8600-8	1961	1.8 (17)	4.8 (17)						
MUSSELSHELL RIVER DRAINAGE (Lakes)									
Yellow Water Res. 18-9500-6	1948	1.9 (87)	3.7 (87)	5.3 (87)	7.6 (78)	8.4 (58)	10.1 (2)		
YELLOWSTONE RIVER DRAINAGE (Lakes)									
Grossfield Res. 21-3340-8	1951	3.2 (21)	8.8 (21)						



Black Crappie, Pomoxis nigromaculatus

Year Collected	I	II	III	IV	V	VI	VII	VIII
MADISON RIVER DRAINAGE (Lakes)								
East Three Forks Ponds 13-8640-7								
1957	1.3 (26)	2.6 (22)	4.3 (21)	5.5 (19)	6.1 (12)	6.5 (7)	7.1 (2)	
Middle Three Forks Pond 13-8640-7	1.0 (29)	2.2 (29)	3.3 (28)	4.3 (25)	5.4 (13)	6.8 (6)	6.9 (1)	
MISSOURI RIVER DRAINAGE (Lakes)								
Port Peck Res. 16-5140-5	1948	4.6 (67)	7.0 (67)	8.3 (67)	9.4 (62)	10.3 (30)	11.7 (4)	
Port Peck Res. 16-5140-5	1949	4.8 (17)	7.1 (17)	8.6 (17)	9.8 (16)	10.6 (5)	10.9 (3)	11.1 (1)
YELLOWSTONE RIVER DRAINAGE (Streams)								
Tongue River 21-1200-1	1954	2.1 (9)	4.4 (8)	6.5 (7)	7.8 (3)	8.9 (2)		
Tongue River 21-1200-1	1955	2.2 (15)	4.8 (14)	6.5 (13)	10.0 (2)			

PERCIDAE

Yellow Perch, Perca flavescens

BLACKFOOT RIVER DRAINAGE (Lakes)								
Brown Lake 4-6210-4								
1954	1.5 (36)	3.2 (36)	4.6 (36)	5.9 (34)	7.1 (24)	8.2 (10)	9.3 (5)	10.9 (1)
Inez Lake 4-6720-3	1954	1.4 (31)	2.8 (31)	4.1 (31)	5.3 (31)	6.3 (25)	7.3 (9)	8.3 (4)
Inez Lake 4-6720-3	1955	1.4 (49)	2.8 (49)	4.2 (49)	5.3 (48)	6.1 (43)	6.6 (28)	7.8 (14)



Yellow Perch, *Perca flavescens* cont.

	Year Collected	I	II	III	IV	V	VI	VII	VIII
BLACKFOOT RIVER DRAINAGE (Lakes)									
Lake Alve 4-6120-3	1948	1.7 (32)	3.4 (32)	5.0 (32)	5.4 (2)				
Rainy Lake 4-7170-3	1948	1.6 (30)	3.2 (30)	4.7 (30)	5.6 (27)	6.2 (20)	6.9 (19)	7.6 (15)	7.8 (9)
Salmon Lake 4-7230-3	1948	1.7 (32)	3.5 (32)	4.9 (29)	5.9 (25)	6.5 (22)	7.0 (15)	8.0 (3)	9.1 (2)
Salmon Lake 4-7230-3	1955	1.6 (51)	3.3 (51)	4.4 (51)	5.3 (51)	5.8 (43)	6.2 (34)	6.7 (6)	
Seeley Lake 4-7260-3	1948	1.3 (10)	2.9 (10)	5.0 (10)	6.1 (1)				
Seeley Lake 4-7260-3	1954	1.3 (25)	2.8 (25)	4.1 (25)	5.4 (25)	6.5 (22)	7.6 (16)	8.4 (3)	9.5 (1)
Seeley Lake 4-7260-3	1955	1.3 (50)	2.7 (50)	3.9 (50)	5.0 (50)	5.8 (46)	6.7 (38)	7.3 (17)	9.2 (1)
Upsata Lake 4-7560-3	1948	2.5 (30)	4.3 (30)	4.7 (15)	5.1 (11)	5.6 (9)			
CLARK FORK COLUMBIA RIVER DRAINAGE (Lakes)									
Lower Thompson Lake 5-9152-3	1954	1.5 (59)	3.1 (54)	4.1 (33)	5.4 (19)	6.9 (14)			
Lower Thompson Lake 5-9152-3	1956	1.7 (39)	3.8 (39)	5.7 (23)	8.2 (6)				
Middle Thompson Lake 5-9232-3	1956	1.6 (29)	3.3 (29)	4.9 (29)	6.6 (4)	8.9 (2)	10.4 (1)		
Rainbow Lake 5-9408-4	1957	1.8 (24)	4.2 (24)	6.3 (24)	7.5 (23)	8.4 (22)	8.9 (16)	9.7 (2)	10.3 (1)



Yellow Perch, Perca flavescens cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
FLATHEAD RIVER DRAINAGE (Lakes)								
Ashley Lake 7-5220-3								
1956	1.8 (43)	4.2 (43)	6.3 (9)	8.7 (8)	10.3 (1)			
Blanchard Lake 7-5400-4	1.5 (51)	3.0 (51)	4.7 (51)	6.6 (44)	8.2 (38)	9.1 (16)	10.4 (5)	11.9 (3)
								IX 12.7 (2)
MADISON RIVER DRAINAGE (Lakes)								
East Three Forks Pond 13-8640-7	1.9 (18)	3.5 (14)	4.6 (13)	4.9 (8)	5.5 (1)			
Middle Three Forks Pond 13-8640-7	2.0 (22)	3.3 (15)	4.1 (14)	4.8 (7)	5.7 (4)			
West Three Forks Pond 13-8640-7	2.4 (43)	4.8 (31)	7.0 (37)	8.5 (23)	9.7 (17)	10.7 (3)		
MARIAS RIVER DRAINAGE (Lakes)								
Dynum Reservoir 14-7080-5	1.4 (63)	3.0 (63)	4.1 (63)	6.7 (40)	7.9 (9)	9.9 (2)	11.6 (1)	
MILK RIVER DRAINAGE (Streams)								
Milk River 15-2760-2	2.1 (21)	3.8 (12)	5.6 (3)					
MISSOURI RIVER DRAINAGE (Lakes)								
Canyon Ferry Res. 17-8832-5	2.5 (88)	5.2 (88)	7.1 (67)	8.7 (39)	10.8 (7)	12.4 (3)		



Yellow Perch, Perca flavescens cont.

Year Collected	I	II	III	IV	V	VI	VII	VIII
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MISSOURI RIVER

DRAINAGE

(Lakes) cont.

Fort Peck Res. 16-5140-5	1949	2.0 (330)	4.7 (329)	7.0 (208)	8.2 (126)	9.2 (90)	9.9 (22)	9.8 (1)
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Nelson Reservoir 16-7180-	1959	2.2 (20)	5.2 (18)	7.3 (13)	8.5 (10)	9.4 (8)	9.8 (3)
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YELLOWSTONE RIVER

DRAINAGE

(Lakes)

Dailey Lake 22-7644-3	1956	2.1 (65)	4.7 (58)	7.1 (30)	8.8 (28)	10.1 (1)	
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(Streams)

Tongue River	1954	2.6 (7)	4.7 (6)	5.7 (1)			
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Tongue River	1955	2.5 (10)	4.3 (9)	5.4 (5)	7.2 (2)	8.4 (1)	9.2 (1)
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Sauger, Stizostedion canadense

MARIAS RIVER

DRAINAGE

(Streams)

Marias River 14-3240-2	1961	4.4 (16)	8.0 (16)	11.1 (14)	13.2 (9)	15.1 (2)	18.3 (1)
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MILK RIVER

DRAINAGE

(Streams)

Milk River	1960	5.1 (5)	9.7 (4)	12.7 (3)	14.4 (1)		
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MISSOURI RIVER

DRAINAGE

(Lakes)

Fort Peck Res. 16-5140-5	1948	5.1 (124)	8.8 (124)	11.7 (118)	14.3 (82)	16.9 (32)	19.4 (13)	20.5 (4)
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Fort Peck Res. 16-5140-5	1949	4.8 (134)	9.6 (129)	12.8 (109)	15.3 (77)	17.6 24.6 (44)	19.2 (11)	
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Walleye, Stizostedion vitreum

Year Collected	I	II	III	IV	V	VI	VII	VIII
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CLARK FORK
COLUMBIA RIVER
DRAINAGE
(Lakes)

Rainbow Lake (Dog Lake) 5-9408-4	1957	4.3 (14)	9.3 (14)	13.5 (13)	16.3 (13)	18.7 (13)	20.4 (11)	21.9 (4)
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MILK RIVER
DRAINAGE
(Lakes)

Frenchman Res. 15-5200-8	1958	7.3 (34)	13.3 (28)	15.8 (9)	18.1 (4)	17.7 (1)		
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(Streams)

Milk River	1960	5.1 (16)	11.8 (9)	16.9 (4)	22.1 (2)	24.2 (2)		
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MISSOURI RIVER
DRAINAGE
(Lakes)

Hauser Lake 17-9056-5	1961	6.6 (9)	12.8 (9)	16.9 (4)	20.7 (1)			
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Nelson Reservoir 16-7180-	1959	3.7 (71)	7.6 (71)	10.6 (20)	13.6 (6)	18.5 (2)	25.6 (1)	
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Whiteside Pond	1960	5.3 (22)	9.1 (22)					
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YELLOWSTONE RIVER
DRAINAGE
(Lakes)

Killens Reservoir 21-4624-8	1959	2.5 (7)	6.7 (7)	11.3 (7)	15.9 (6)			
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Killens Reservoir 21-4624-8	1960	3.1 (18)	6.7 (18)	12.0 (12)	16.0 (12)	17.6 (7)		
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Westrope Lake 21-9400-8	1957	4.3 (45)	9.1 (45)	13.4 (45)	15.4 (45)			
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COTTIDAE

Mottled Sculpin, Cottus bairdi

West Gallatin *29.6-56.7 64.4-79.3 80.5-98.0 84.0-118.5 93.0-110.0
River

*Average total lengths of age groups from 151 specimens in mm.



TABLE II. Age and growth of Montana fish enumerated for (1) lakes, (2) streams, and (3) all waters. Average calculated total length, in inches, are shown for each annulus. The number of fish is indicated by the number in parentheses.

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
Lake Whitefish, <u>Coregonus clupeaformis</u>											
Lakes	7.0 (54)	10.9 (53)	14.0 (53)								
Streams	3.9 (6)	7.8 (6)	11.4 (6)	13.1 (5)	14.6 (2)						
All Waters	6.7 (60)	10.6 (59)	13.7 (59)	13.1 (5)	14.6 (2)						
Mountain Whitefish, <u>Prosopium williamsi</u>											
Lakes	3.6 (815)	7.4 (773)	9.5 (578)	10.8 (288)	11.8 (87)	12.1 (50)	11.6 (7)	12.5 (5)	12.7 (2)	13.5 (2)	13.6 (1)
Streams	3.5 (1200)	7.1 (879)	9.7 (614)	11.5 (343)	13.5 (124)	12.7 (13)	14.5 (22)	16.8 (4)	17.4 (1)		
All Waters	3.6 (2015)	7.3 (1652)	9.6 (1192)	11.2 (631)	12.9 (211)	12.2 (53)	13.8 (29)	14.4 (9)	14.2 (3)	13.5 (2)	13.6 (1)
Kokanee, <u>Oncorhynchus tshawytscha</u>											
Lakes	4.3 (124)	9.8 (93)	12.1 (46)	15.1 (20)	18.4 (3)						
Coho Salmon, <u>Oncorhynchus kisutch</u>											
Lakes	4.8 (140)	9.8 (123)	9.9 (28)	11.2 (24)	10.9 (3)						
Golden Trout, <u>Salmo aquabonita</u>											
Lakes	4.7 (25)	8.4 (24)	11.4 (13)	13.2 (6)							
Cutthroat Trout, <u>Salmo clarkii</u>											
Lakes	3.0 (2128)	5.4 (2012)	9.5 (1445)	12.1 (584)	13.7 (109)	14.1 (18)	14.5 (1)				
Streams	2.9 (2323)	5.2 (1560)	7.8 (58)	11.0 (135)	13.0 (25)	11.9 (2)					
All Waters	2.9 (4451)	5.9 (3581)	9.0 (7013)	11.9 (719)	13.6 (134)	13.9 (20)	14.5 (1)				



	I	II	III	IV	V	VI	VII	VIII	IX
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Rainbow Trout, Salmo gairdneri

Lakes	1.5 (3214)	8.2 (2587)	12.8 (1920)	16.1 (951)	18.4 (329)	19.9 (47)	21.6 (5)	
Ponds	4.2 (215)	8.6 (132)	13.0 (71)	18.4 (11)	20.8 (4)	21.6 (1)		
Streams	3.3 (4751)	6.7 (2928)	9.9 (1117)	12.7 (327)	14.3 (45)	15.2 (?)		
All Waters	3.4 (7780)	7.4 (5547)	11.8 (3108)	15.2 (1289)	17.9 (376)	19.3 (55)	21.6 (1)	

Mainbow & Cutthroat Trout Hybrids

Lakes	3.3 (18)	7.9 (38)	9.5 (16)	10.6 (11)	10.7 (2)			
Streams	3.1 (468)	6.2 (293)	9.5 (149)	12.6 (46)	13.7 (16)	18.1 (1)		
All Waters	3.1 (493)	6.4 (327)	9.5 (161)	12.2 (57)	13.4 (18)	18.1 (1)		

Brown Trout, Salmo trutta

Lakes	3.5 (749)	8.8 (923)	13.1 (582)	15.7 (289)	17.6 (59)	19.6 (14)	22.9 (3)	24.0 (1)
Streams	3.6 (3702)	8.6 (2146)	11.4 (1140)	14.4 (357)	16.8 (72)	19.2 (16)	22.1 (3)	
All Waters	3.6 (4451)	8.7 (2869)	12.0 (1722)	15.0 (666)	17.2 (131)	19.4 (30)	21.9 (6)	24.0 (1)

Brook Trout, Salvelinus fontinalis

Lakes	3.3 (2007)	6.2 (1588)	8.3 (857)	10.2 (177)	15.0 (12)	15.1 (2)	17.4 (1)	
Streams	3.3 (2501)	5.7 (1153)	8.3 (220)	10.7 (23)	16.0 (4)			
All Waters	3.3 (4508)	6.0 (2741)	8.3 (1077)	10.3 (300)	15.2 (16)	15.1 (2)	17.4 (1)	

Dolly Varden, Salvelinus malma

Lakes	2.8 (650)	5.6 (650)	8.6 (593)	12.3 (411)	16.0 (210)	21.1 (68)	24.6 (13)	24.9 (2)
Streams	3.2 (360)	5.7 (234)	8.8 (112)	13.1 (16)	15.8 (3)	14.4 (1)	16.7 (1)	



	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
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Dolly Vardon, Salvelinus malma cont.

All Waters	2.9 (1010)	5.6 (884)	8.6 (705)	12.3 (427)	16.0 (213)	21.0 (69)	24.0 (14)	24.9 (2)			
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Lake Trout, Salvelinus namaycush

Lakes	2.8 (32)	5.8 (32)	9.2 (29)	14.3 (22)	20.0 (19)	24.9 (18)	29.4 (17)	31.5 (15)	31.8 (4)		
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Arctic Grayling, Thymallus arcticus

Lakes	3.8 (108)	8.7 (85)	11.2 (45)	11.9 (8)	12.7 (3)	13.9 (1)					
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Streams	5.3 (26)	10.3 (26)	13.1 (23)	13.7 (10)	14.2 (1)						
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All Waters	4.1 (134)	9.1 (111)	12.4 (69)	12.9 (18)	13.1 (4)	13.9 (1)					
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Goldeye, Hiodon alosoides

Lakes	4.6 (324)	8.8 (323)	11.2 (289)	12.3 (147)	13.3 (46)	14.1 (8)					
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Streams	3.3 (17)	6.9 (17)	9.7 (17)	10.9 (16)	11.5 (12)	12.2 (1)					
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All Waters	4.5 (341)	8.7 (340)	11.1 (306)	12.2 (163)	12.9 (58)	13.9 (9)					
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Northern Pike, Esox lucius

Lakes	11.1 (41)	16.2 (31)	19.2 (24)	27.0 (1)	27.0 (1)						
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Utah Chub, Osteomugil atraria

Lakes	1.6 (475)	3.5 (437)	6.1 (435)	8.2 (382)	9.7 (329)	10.9 (227)	12.4 (38)	13.6 (4)			
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Pearlmouth, Mylechelus caurinus

Lakes	2.6 (300)	4.6 (300)	6.7 (294)	8.3 (200)	9.6 (176)	10.6 (125)	11.5 (71)	12.6 (12)	13.5 (1)		
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Streams	2.4 (36)	4.6 (22)	6.1 (6)	8.4 (3)							
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All Waters	2.6 (336)	4.6 (322)	6.7 (500)	8.3 (203)	9.6 (176)	10.6 (125)	11.5 (71)	12.6 (12)	13.5 (1)		
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I II III IV V VI VII VIII IX X XI

Northern Squawfish, Ptychocheilus oregonensis

Lakes	2.1 (284)	3.3 (284)	4.6 (284)	5.9 (284)	7.2 (275)	8.4 (242)	9.6 (187)	10.5 (113)	11.5 (73)	12.3 (38)	13.4 (16)
Streams	1.8 (112)	3.5 (86)	5.2 (59)	7.2 (27)	9.0 (21)	10.6 (18)	12.2 (14)	12.8 (5)	14.7 (3)	16.1 (3)	17.4 (1)
All Waters	2.0 (396)	3.4 (370)	4.7 (343)	6.0 (311)	7.4 (296)	8.6 (260)	9.8 (201)	10.6 (118)	11.6 (76)	12.6 (41)	13.6 (17)
											XII 14.4 (9)

Longnose Sucker, Catostomus catostomus

Lakes	1.7 (136)	4.3 (136)	5.7 (122)	9.6 (90)	11.7 (45)	14.0 (25)	15.8 (12)	17.1 (5)
Streams	1.6 (152)	3.9 (107)	7.1 (84)	9.9 (60)	11.9 (27)	13.9 (11)	13.8 (4)	14.6 (1)
All Waters	1.7 (288)	4.2 (243)	6.3 (206)	9.7 (150)	11.8 (72)	14.0 (36)	15.2 (16)	16.7 (6)

White Sucker, Catostomus commersoni

Lakes	2.1 (282)	5.8 (243)	9.0 (193)	11.6 (154)	12.9 (72)	14.9 (14)	15.4 (8)	16.4 (4)	17.1 (1)
Streams	2.1 (88)	6.1 (49)	8.8 (31)	10.6 (17)	11.3 (5)	11.6 (1)			
All Waters	2.1 (370)	5.8 (292)	9.0 (224)	11.5 (171)	12.8 (77)	14.7 (15)	15.4 (8)	16.4 (4)	17.1 (1)

Largescale Sucker, Catostomus macrocheilus

Lakes	1.8 (205)	3.3 (145)	5.4 (93)	7.4 (73)	10.3 (68)	12.9 (44)	15.7 (37)	16.8 (12)
Streams	1.4 (15)	3.7 (15)	6.1 (10)	9.1 (5)	11.0 (2)	13.1 (1)	14.5 (1)	

Northern Redhorse, Moxostoma macrolepidotum

Streams	1.4 (15)	3.7 (15)	6.1 (10)	9.1 (5)	11.0 (2)	13.1 (1)	14.5 (1)



	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
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Pumpkinseed, Lepomis gibbosus

Lakes	1.1 (73)	2.1 (73)	3.1 (73)	3.6 (60)	4.4 (41)	4.5 (28)	4.3 (19)	7.3 (1)	7.7 (1)		
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Lepomis macrochirus

Lakes	1.4 (201)	2.6 (166)	3.9 (137)	4.8 (122)	5.7 (91)	6.5 (43)	6.9 (10)	7.6 (2)			
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Largemouth Bass, Micropterus salmoides

Lakes	2.2 (449)	5.1 (416)	7.5 (320)	9.3 (260)	10.7 (185)	12.6 (84)	14.1 (63)	14.9 (44)	15.1 (15)	15.6 (6)	17.9 (1)
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Black Crappie, Pomoxis nigromaculatus

Lakes	3.3 (139)	5.3 (135)	6.7 (133)	7.8 (122)	8.4 (60)	8.3 (20)	8.1 (4)				
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Streams	2.2 (24)	4.6 (22)	6.5 (20)	8.7 (5)	8.6 (2)						
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All Waters	3.1 (163)	5.2 (157)	6.6 (153)	7.8 (127)	8.4 (62)	8.3 (20)	8.1 (4)				
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Yellow Perch, Perca flavescens

Lakes	1.8 (1270)	3.9 (1232)	5.5 (962)	6.7 (690)	7.4 (468)	7.6 (235)	8.0 (76)	9.3 (20)	11.5 (3)		
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Streams	2.3 (38)	4.2 (27)	5.5 (9)	7.2 (2)	8.4 (1)	9.2 (1)					
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All Waters	1.8 (1308)	3.9 (1259)	5.5 (971)	6.7 (692)	7.4 (469)	7.6 (236)	8.0 (76)	9.3 (20)	11.5 (3)		
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Sauger, Stizostedion canadense

Lakes	4.9 (258)	9.2 (25)	11.2 (227)	14.8 (165)	15.6 (76)	19.3 (24)	20.5 (4)				
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Streams	4.5 (21)	8.3 (20)	11.4 (17)	13.3 (10)	15.1 (2)	18.3 (1)					
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All Waters	4.9 (279)	9.1 (273)	11.2 (244)	14.7 (175)	15.6 (78)	19.3 (25)	20.5 (4)				
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Walleye, Stizostedion vitreum

Lakes	4.6 (220)	9.0 (214)	12.9 (110)	15.7 (87)	18.3 (23)	20.8 (12)	21.9 (4)				
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	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
Streams	5.1 (16)	11.8 (9)	16.9 (4)	22.1 (2)	2.42 (2)						
All Waters	4.6 (236)	9.2 (223)	13.0 (114)	15.9 (89)	18.8 (25)	20.8 (12)	21.9 (4)				



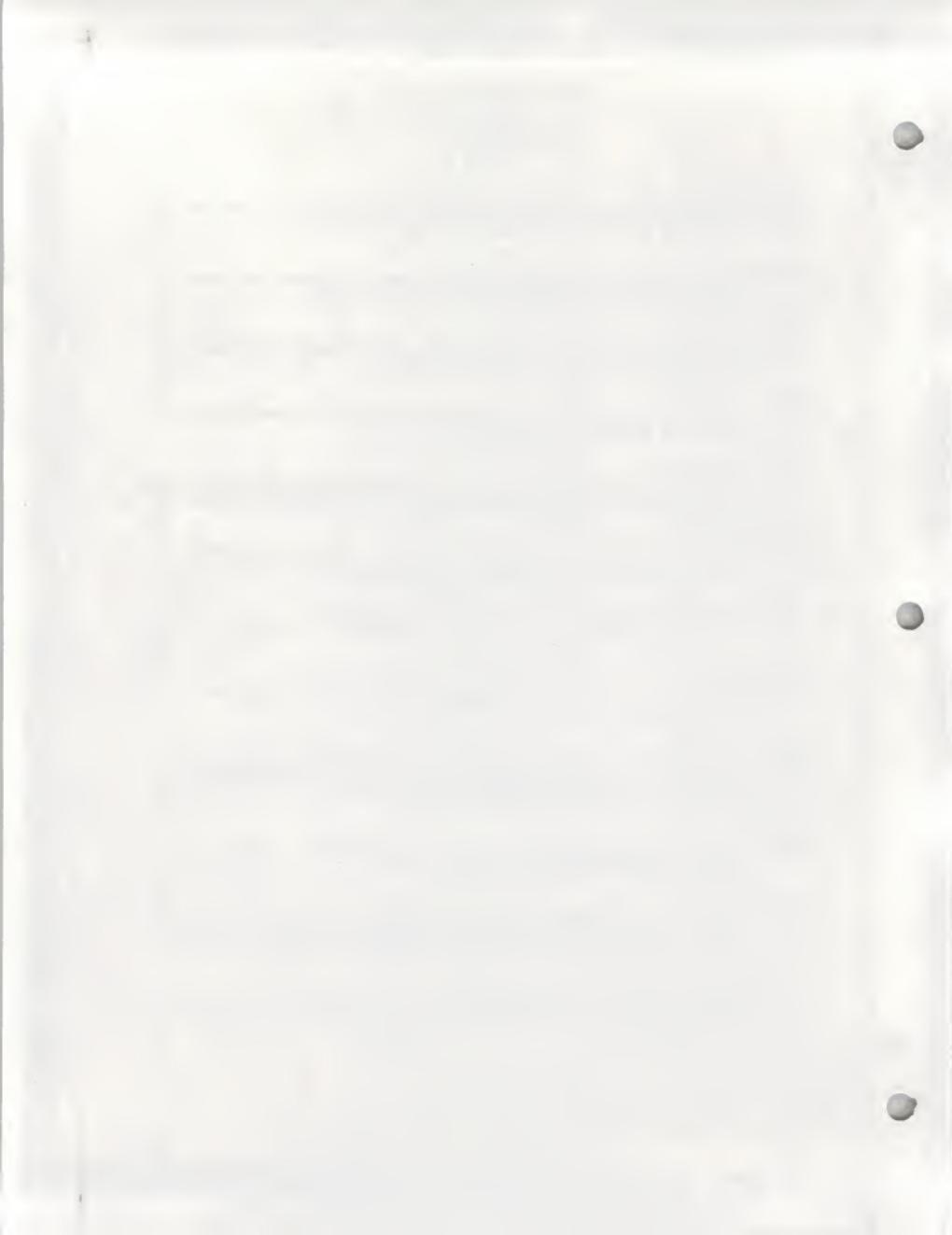
TABLE III. Major drainage divisions with IBM code numbers.
(Four digits or more follow the drainage number.)

- 1- Beaverhead
- 2- Big Hole
- 3- Bitterroot
- 4- Blackfoot
- 5- Clark Fork (Below Bitterroot River)
- 6- Clark Fork (Above Bitterroot River)
- 7- Flathead (Below South Fork of Flathead River)
- 8- Flathead (Above and Incl. South Fork of Flathead River)
- 9- Gallatin
- 10- Jefferson
- 11- Kootenai
- 12- Little Missouri
- 13- Madison
- 14- Marias
- 15- Milk
- 16- Missouri (Below Marias River)
- 17- Missouri (Above Marias River)
- 18- Musselshell
- 19- St. Mary's
- 20- Sun
- 21- Yellowstone (Below Big Horn River)
- 22- Yellowstone (Above and Incl. Big Horn River)



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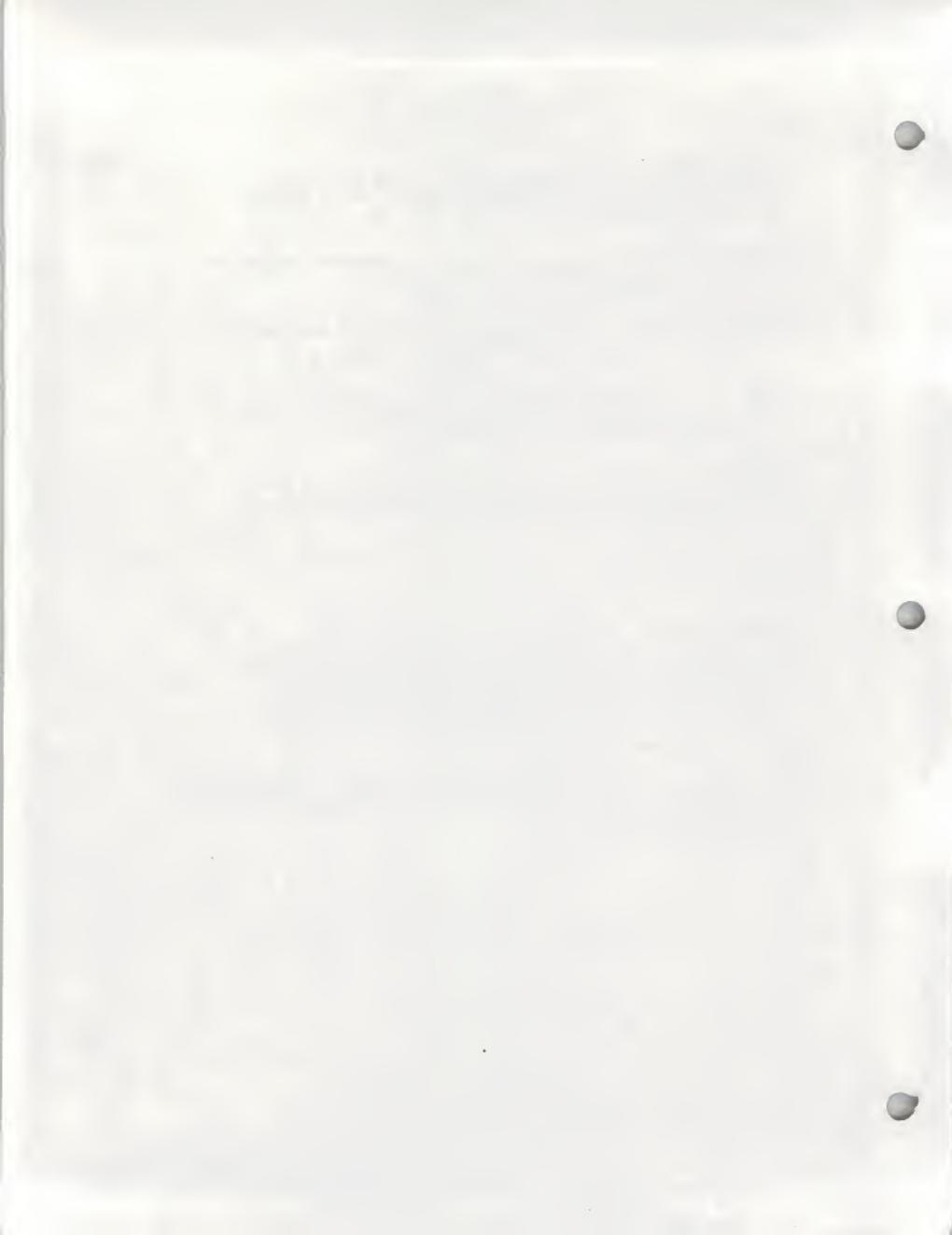
Recommendations:

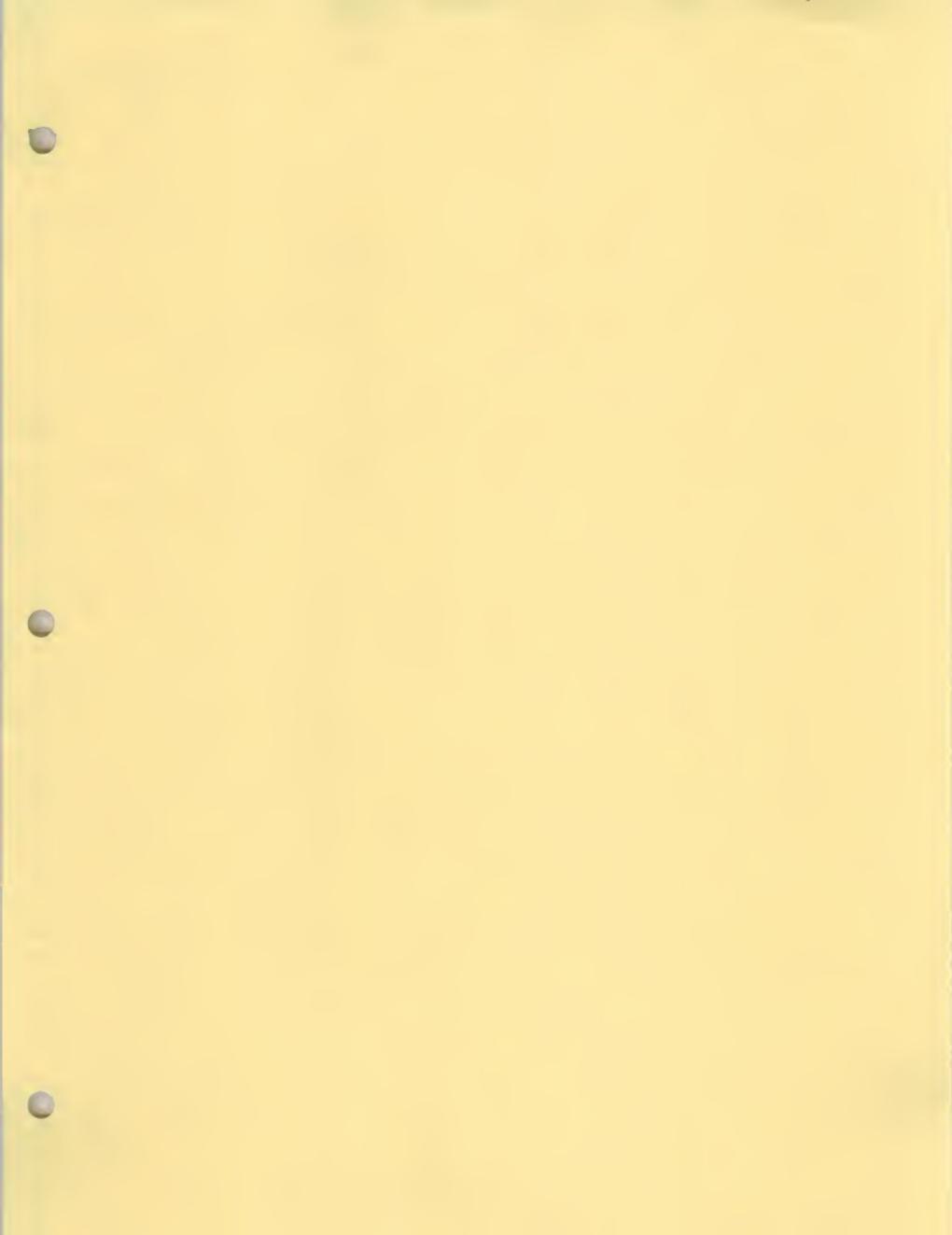
Collection and analysis of fish scales for age and growth
should continue with attention devoted to collecting adequate
samples from waters important to fish management. A review
should be made and standard methods established for aging col-
lections. Population statistics should be estimated from impor-
tant age and growth collections.

Prepared by John C. Peters

Approved by George D. Holton

Date January 15, 1964







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639.31
F-23-R-5
I III
1962

MONTANA FISH AND GAME DEPARTMENT
FISHERIES DIVISION
HELENA, MONTANA

STATE DOCUMENTS

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State of Montana

Project No. F-23-R-5

Name Fishery Investigation Laboratory

Job No. I & II

Title Age and Growth Studies and Analysis of

Bottom Samples in Connection with Pollution

Studies

Period Covered: May 1, 1961 to June 30, 1962

Abstract:

Over 7,000 scale samples were processed in the laboratory during 1961-62. A summary of average growth rates is presented for the larger collections aged in the laboratory. No benthos analysis work was done during the year.

Objectives:

In formulating a sound fisheries management program it is necessary to know the growth rates and age composition of the fish populations. This laboratory provides facilities for processing scale samples, determining age and growth and maintaining files of age and growth data. The laboratory is located at Montana State College and this allows for the utilization of well-trained student laboratory assistants in both scale work and in the tedious analysis of bottom samples.

Techniques and Findings:

During 1961-62, over 7,000 scale samples were received and mounted in the laboratory. These included two large collections, from Flathead Lake and Dailey Lake, which were mounted for analysis as a part of special graduate research projects. One collection of Kokanee otoliths from Flathead Lake were aged. Data from the collections aged were returned to the biologists throughout the State.

A summary of the significant scale samples aged in the laboratory during 1961-62 are shown on Table I.

Age and growth data in the laboratory files were summarized and placed on file cards. A complete list of age and growth data is now in preparation.

No benthos analysis work was done during the year.

Table I - Summary of Age and Growth Studies for 1961-62

SALMONIDAE

	I	II	III	IV	V	VI
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Lake Whitefish - Coregonus clupeaformis

Noxon Rapids Reservoir	7.0(54)	10.9(53)	14.0(53)			
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Mountain Whitefish - Prosopium williamsoni

Beaverhead River	4.8(14)	9.5(14)	11.4(10)	12.6(6)	13.9(2)	
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Doctor Lake	1.8(7)	3.3(7)	4.7(7)	6.2(7)	7.6(6)	8.9(5)
	<u>VII</u> 10.0(4)	<u>VIII</u> 11.1(3)	<u>IX</u> 12.7(2)	<u>X</u> 13.5(2)	<u>XI</u> 13.6(1)	

Hungry Horse Res.(1961)	3.4(119)	7.4(114)	10.0(94)	11.1(61)	12.7(27)	13.7(5)
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Hungry Horse Res.(1958)	3.3(103)	7.0(99)	9.3(77)	10.8(48)	11.3(14)	12.5(3)
	<u>VII</u> 13.8(2)	<u>VIII</u> 14.6(2)				

Inez Lake	3.5(25)	6.6(25)	8.7(23)	10.0(18)	10.9(7)	11.1(7)
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Marias River	4.2(14)	6.3(7)	11.0(1)	12.1(1)	14.4(1)	
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Salmon Lake	3.2(33)	6.6(32)	9.4(29)	10.5(15)	11.7(7)	13.0(3)
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Kokanee - Onchorhynchus nerka

Georgetown Lake	4.0(8)	9.0(8)	10.7(5)			
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Salmon Lake	4.1(16)	8.8(6)				
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Cutthroat Trout - Salmo clarki

Boulder Creek	3.5(35)	6.3(12)	9.9(1)			
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Bowman Lake	2.8(24)	6.1(26)	8.9(25)			
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Cabin Lake	2.3(17)	7.1(17)	10.0(17)			
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Doctor Lake	2.1(21)	4.9(21)	6.9(21)	8.9(19)	10.3(13)	11.3(3)
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Finley Creek	1.9(10)	4.6(9)	7.0(2)			
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Fish Lake No. 1	3.1(20)	5.5(17)	7.5(17)	9.1(8)		
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Fish Lake No. II	2.8(6)	6.0(6)	9.4(5)	11.0(1)		
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Georgetown Lake	2.7(8)	7.0(8)	10.6(3)	12.6(1)		
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Holiday Lake	3.9(14)	9.9(14)	16.0(3)	12.5(1)		
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Table I - cont'd

	I	II	III	IV	V	VI
Hungry Horse Res.(1961)	2.4(51)	4.6(51)	8.0(43)	12.3(37)	14.5(29)	15.2(7)
Hungry Horse Res.(1958)	2.8(70)	5.8(66)	9.5(45)	12.2(23)	13.7(6)	
Koessler Lake	2.4(13)	5.6(15)	9.1(15)	11.5(12)		
Lick Lake	3.0(8)	6.2(8)	9.3(5)	12.0(2)		
Lost Horse Creek	2.6(11)	4.4(9)	6.3(4)	6.3(1)		
Lower Twin Lakes	2.9(7)	6.4(7)	9.8(6)	12.4(2)		
Miller Creek	3.0(19)	5.1(4)	7.4(3)			
Running Wolf Creek	3.0(5)	5.0(2)				
Stoney Lake	3.6(30)	6.7(35)	9.3(25)	11.4(14)	14.0(3)	
Twelve Mile Creek	2.4(46)	4.6(15)	6.2(1)			
Upper Twin Lake	3.4(16)	6.6(12)	10.8(11)	15.0(11)	18.0(5)	
Van Lake	3.7(12)	8.3(12)	17.3(9)			
Wolf Creek	3.8(6)	9.7(2)				

Rainbow Trout - *Salmo gairdneri*

Bashum Lake	2.7(8)	5.4(8)	7.9(8)	11.9(2)		
Beaverhead River	2.7(11)	8.9(9)	13.2(9)	14.9(3)		
Bowman Lake	3.2(11)	6.4(11)	9.0(9)	12.1(2)		
Browns Lake	4.1(30)	7.2(30)	10.9(2)			
Dead Man's Basin	3.3(18)	1.0(18)	1.0(4)	1.0(1)		
Dry Fork Marias River	2.2(11)	8.8(11)	12.0(8)			
Duck Lake	11.3(1)					
Echo Lake	3.0(12)	7.0(12)	1.0(7)			
East Fork Reservoir	3.0(29)	9.0(38)	13.5(16)	17.6(4)		
Harrison Lake	2.9(30)	7.3(12)	11.1(9)	12.9(3)	14.9(2)	16.1(2)
Holiday Lake	3.6(53)	7.9(44)	12.4(26)			
Lena Lake	2.5(12)	6.3(12)	9.9(10)	12.3(1)		
McGilvary Lake	2.6(27)	5.8(27)	10.8(27)			

Table I - cont'd

	I	II	III	IV	V	VI
McKafery Lake	3.1(16)	7.3(16)	9.4(10)	11.0(5)		
Marias River	3.4(19)	8.9(7)	12.1(5)	13.3(4)		
Marias River	2.8(25)	6.7(20)	11.4(17)	12.6(13)	14.1(5)	
Marias River	3.3(35)	9.6(32)	12.1(21)	12.2(1)		
Meadow Lake	2.4(17)	5.3(17)	8.3(14)	10.3(?)	12.5(4)	
Moose Lake	2.3(23)	8.4(23)	12.1(20)	14.9(4)		
Noxon Rapids Reservoir	2.6(30)	5.7(30)	9.2(28)	13.5(15)	16.4(8)	22.4(1)
Running Wolf Creek	3.0(23)	5.7(16)	6.0(3)			
Stafford Lake	0.4(9)	1.0(9)	1.1(5)	1.5(1)		
Thompson River	2.5(31)	7.8(1)				
Tiber Reservoir	8.0(44)	11.6(42)	13.1(34)	13.2(1)		
Wolf Creek	2.7(15)					
 Brown Trout - <u>Salmo trutta</u>						
Bluewater Creek	3.8(101)	6.6(43)	9.7(17)	14.2(4)	15.7(1)	17.3(1)
Clarks Fork River	3.1(18)	6.2(15)	12.9(2)			
Harrison Lake	3.0(45)	7.6(35)	11.0(15)	14.4(5)	17.7(2)	
Noxon Rapids Reservoir	2.7(21)	5.8(21)	10.1(21)	12.8(16)	15.3(2)	
Salmon Lake	2.9(6)	5.4(6)	8.9(6)	11.7(5)	14.1(3)	15.8(2)
 Eastern Brook Trout - <u>Salvelinus fontinalis</u>						
Culver Pond	3.7(24)	6.6(17)	10.6(5)			
Diamond Lake	2.7(75)	5.8(75)	7.5(11)			
Echo Lake	3.0(13)	5.9(13)	8.4(3)	11.9(1)	14.5(1)	16.0(1)
						VII
						17.4(1)
East Fork Reservoir	3.0(8)	6.1(8)	8.8(5)			
Finley Creek	3.3(10)	4.4(1)				

Table I - cont'd

	I	II	III	IV	V	VI
Georgetown Lake	3.1(9)	5.1(9)	10.0(7)			
Holiday Lake	4.1(58)	8.4(57)	11.0(37)			
Lake of the Woods	2.4(7)	5.1(7)	7.2(3)			
Miller Creek	3.1(15)	6.3(5)				
Running Wolf Creek	2.9(25)	5.5(11)				
Silver Lake	2.9(29)	5.9(28)	7.2(5)	8.5(1)		
Twelve Mile Creek	2.9(11)	5.0(5)	7.4(2)			
Wolf Creek	3.8(6)	9.7(2)				
Wolf Creek	3.0(32)	5.8(18)	8.6(3)			

Dolly Varden - *Salvelinus mema*

Boulder Creek	2.8(34)	5.6(17)				
Doctor Lake	3.0(6)	5.4(6)	10.0(6)	13.3(6)	18.0(2)	
East Fork Reservoir	3.1(34)	6.9(34)	10.6(25)	14.7(4)		
Hungry Horse Res.(1958)	2.6(152)	5.4(152)	8.7(138)	12.7(98)	17.1(40)	20.6(19)
Hungry Horse Res.(1961)	2.8(214)	5.5(214)	8.7(194)	13.0(133)	17.5(91)	23.3(31)
						VII 27.6(5)

Salmon Lake	3.0(15)	5.9(15)	9.2(14)	12.5(10)	17.3(1)	
Twelve Mile Creek	2.3(6)	4.2(3)	6.4(2)			

Lake Trout - *Salvelinus namaycush*

Whitefish Lake	3.0(17)	5.8(17)	9.4(17)	14.3(17)	20.0(17)	25.0(17)	
					VII 29.3(17)	VIII 31.5(15)	IX 3.1(4)

HIODONTIDAE ..

Goldeye - *Hiodon alosoides*

Marias River	3.3(17)	6.9(17)	9.7(17)	10.9(16)	11.5(12)	12.2(1)
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CATOSTOMIDAE

Longnose Sucker - *Catostomus catostomus*

Bluewater Creek	1.7(107)	4.1(65)	7.3(46)	10.6(29)	12.6(12)
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Table I - cont'd

	I	II	III	IV	V	VI
Marias River	1.4(45)	3.7(42)	6.7(38)	9.2(30)	11.4(15)	13.4(9)
					VII 13.8(4)	VIII 14.6(1)
Tiber Reservoir	1.2(6)	2.7(6)	6.9(6)	10.0(6)	11.8(5)	12.8(2)
White Sucker - <u>Catostomus commersoni</u>						
Bluewater Creek	1.8(56)	4.6(17)	6.5(8)	8.8(6)	9.9(3)	11.6(1)
Culver Pond	1.5(23)	5.0(23)	9.0(15)			
Marias River	2.6(32)	6.9(32)	9.6(23)	11.6(11)	13.4(2)	
Poplar Creek	1.6(18)	3.1(14)	4.7(11)	7.0(3)	8.6(3)	10.7(2)
					VII 10.5(1)	
Tiber Reservoir	1.1(92)	3.0(91)	5.8(85)	8.2(69)	10.2(8)	
N. Redhorse Sucker - <u>Moxostoma macrolepidotum</u>						
Marias River	1.4(15)	3.7(15)	6.1(10)	9.1(5)	11.0(2)	13.1(1)
					VII 14.5(1)	
CENTRARCHIDAE						
Pumpkinseed - <u>Lepomis gibbosus</u>						
Blanchard Lake	0.8(6)	1.6(6)	2.5(6)	4.3(3)	6.0(2)	5.8(1)
					VII 6.4(1)	VIII 7.3(1)
						IX 7.7(1)
Bluegill - <u>Lepomis macrochirus</u>						
Engdahl Reservoir	0.9(4)	3.6(4)	5.8(4)	7.0(4)	7.2(1)	
Jacobson Reservoir	1.0(10)	2.8(10)	4.0(10)	5.4(10)	6.0(10)	6.6(10)
Stafford Lake	0.4(9)	1.0(9)	1.1(5)	1.5(11)		
Largemouth Bass - <u>Micropterus salmoides</u>						
Engdahl Reservoir	2.7(4)	7.9(4)	10.4(4)			

Table I - cont'd

7

	I	II	III	IV	V	VI
Tolksdorf Reservoir	1.8(17)	4.8(17)				
Latka Reservoir	1.8(42)	4.8(42)				

PERCIDAE

Yellow Perch - *Perca flavescens*

Blanchard Lake	1.5(51)	3.0(51)	4.7(51)	6.6(44)	8.2(38)	9.1(16)
				<u>VII</u>	<u>VIII</u>	<u>IX</u>
				10.4(5)	11.9(3)	12.7(2)

Sauger - *Stizostedion canadense*

Marias River	4.4(16)	8.0(16)	11.1(14)	13.2(9)	15.1(2)	18.3(1)
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Walleye - *Stizostedion vitreum*

Hauser Lake	6.6(9)	12.8(9)	16.9(4)	20.7(1)
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Recommendations:

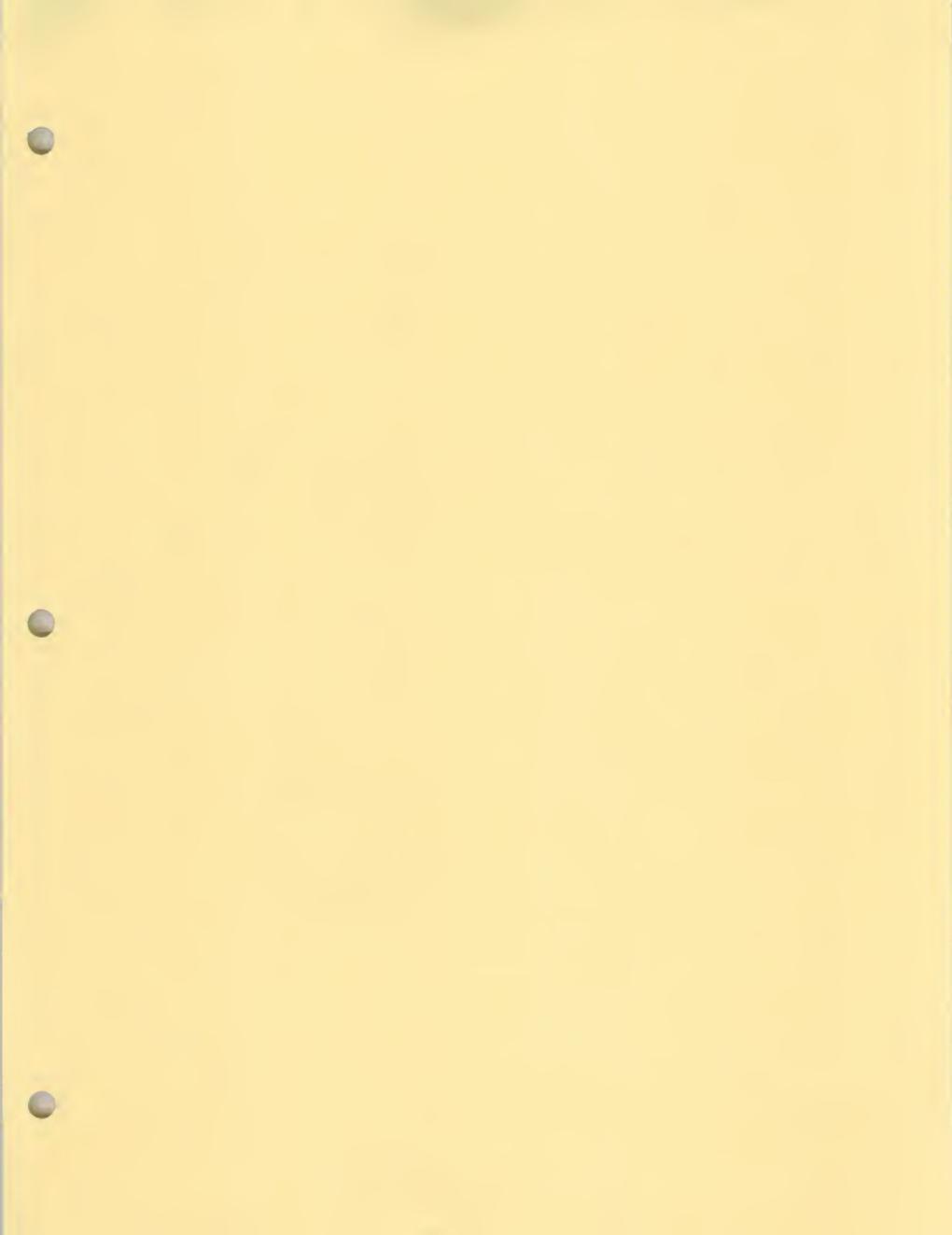
Collection and analysis of fish scales for age and growth should continue with attention devoted to collecting adequate samples from the important waters. Work on assembling age and growth data has progressed to where we will be able to determine weak areas in the collections.

Prepared by John R. HeatonApproved by George D. Holton

George D. Holton

Date July 5, 1962







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F-23-R-4

III

MONTANA FISH AND GAME DEPARTMENT
FISHERIES DIVISION
HELENA, MONTANA

STATE DOCUMENTS COLLECTION

JOB COMPLETION REPORT
INVESTIGATIONS PROJECTS

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State of Montana

Project No.: F-23-R-4 Name Fishery Investigation Laboratory

Job No.: III Title A study of the relationship
between total dissolved solids
and trout growth rate

Period covered: May 1, 1960 to April 30, 1961

Abstract:

Growth rate of brook, brown, rainbow and cutthroat trout from Montana lakes and streams was studied in relation to dissolved mineral content. Specific conductance measured in the field with a portable meter was used as the index to mineral abundance. Waters were classified as low mineral content (less than 150 micromhos) and high mineral content (150 micromhos or more). Growth rates were classified as slow (less than 7.0 inches average length at the second annulus) and fast (7.0 inches or larger at the second annulus). Of the 100 growth samples, 26 were from low mineral waters. All but two of the latter were in the slow growth category. There were 38 slow growth samples from the good fertility waters. It is suggested that slow growth in these 38 waters may have resulted from short growing seasons, overpopulation or habitat deterioration and that fast growth could not occur in the 26 low mineral waters because of insufficient mineral content.

Objectives:

The present study was undertaken to explore the possibility of using dissolved mineral content as an indicator of conditions favorable for trout growth in Montana lakes and streams. Reimers (1955) found a fair degree of correlation between trout growth rate and dissolved solids content of 10 alpine lakes. Rawson (1951) stated that, "A positive correlation was found between the total solids in the water and the average standing crops of plankton and bottom fauna," and that "Recent studies in lakes of northwestern Canada suggest that the total mineral content of waters provides a rough indicator of edaphic conditions which must in some measure affect the productivity of lakes." Larkin and Northcote (1958) state: "In applying our findings to a scheme of lake typology for British Columbia, we could consider only the overriding significance of total dissolved solid content as an index of production. Bearing in mind that total dissolved solids summarizes aspects of both the substrate and the climate as well as their interaction, it should be the best single indicator of a large portion of the physical environment."

1 MÁY 20 2003

Techniques Used:

Gravimetric determinations of total dissolved solids are time consuming and therefore seldom applied to fishery management problems. Recently developed transistorized portable conductivity meters (Edmondson, 1956) provide a more practical and reasonably accurate index to mineral content of surface waters. Lennon (1959) demonstrated that electrolyte measurements can be used to estimate the total dissolved solid content of water within \pm 2 ppm in certain Appalachian streams. Lennon's conversion formula was not applicable to many Montana waters; therefore, we did not attempt to convert electrolyte readings to total dissolved solids equivalents. Anyone using the electrolyte method of estimating total dissolved solids in Montana waters should determine the exact relationship for each drainage involved.

Specific conductance was measured with a model RA-2 conductivity meter manufactured by Industrial Instruments, Inc. of New Jersey. The instrument had a splash proof case with carrying handle and weighed four pounds. In order to avoid difficulties with seasonal variations, the majority of electrolyte readings were made in September and October, 1960. Readings from the Flathead and Kootenai drainages were made in November, 1960. Conductivity in micromhos, water temperature and location were recorded at the lake or stream. The field readings were later corrected to standard temperature (77°F.) for specific conductance. The specific conductance values were then compared directly with trout growth rates.

Age and growth data from approximately 50,000 individual scales have been analyzed for Montana fishes during the period from 1948 to 1960. Most of this growth data appeared previously in federal aid project completion reports. Age and growth data cited in this report includes: Purkett (1951) West Gallatin River rainbow trout, cutthroat trout, brown trout and brook trout; Purkett (1951) Bridger Creek rainbow trout; Kathrein (1951) Missouri River rainbow trout and brown trout; Bishop (1955) Prickley Pear Creek rainbow trout, brown trout and brook trout; Domrose (1960) Big Hole River, Bloody Dick Creek, Placid Creek, O'Brien Creek, Sheep Creek, Trail Creek, Clear Creek, Big Elk Creek and Smith Creek brook trout; Heaton (1960) Boulder River drainage rainbow trout and brown trout; Posewitz (1960) Willow Creek Reservoir rainbow trout and brown trout.

Average calculated total lengths at the second annulus were used as an index of growth rate of brook, brown, rainbow and cutthroat trout. Only scale samples which involved 25 or more calculated lengths were used. A total of 28 lake samples and 72 stream samples satisfied this requirement.

From an examination of the work by Larkin et al (1957 and 1958) it appears that where total dissolved solids is over 100 ppm there is not necessarily a direct relationship between total dissolved solids and either productivity or growth rate but below 100 ppm, productivity is usually low. As an approximate rule of thumb, total dissolved solids in parts per million is about 0.65 of the specific conductivity in micromhos. Therefore, low productivity and slow growth should be expected where conductivity is less than 150 micromhos. For practical fishery management applications, average calculated length of seven inches or less at the second annulus was considered slow growth. The majority of such fish would not be available to the



creel until their third summer of life while faster growing fish would enter the creel in significant numbers during their second summer.

Findings:

Average calculated lengths at the second annulus ranged from 4.2 inches for brook trout in the upper Big Hole River to 16.8 inches for rainbow trout in Duck Lake (Appendix). Conductivities ranged from 23 micromhos in Miner Lake to 978 micromhos in Big Elk Creek (Appendix). Of the 72 stream samples (Table 1), 16 were taken from water of low conductivity. All 16 were in the slow growth category. All eight cutthroat trout samples were in the slow

Table 1 - Trout growth rate in relation to conductivity in 72 Montana streams

Species	High Conductivity		Low Conductivity		Totals
	Slow growth	Fast growth	Slow growth	Fast growth	
Brook trout	9	3	7	0	19
Brown trout	6	10	2	0	18
Rainbow trout	17	6	4	0	27
Cutthroat trout	5	0	3	0	8
Totals	37	19	16	0	72

growth classification. This should be expected as pure cutthroat trout populations have been restricted to the headwater portions of Montana drainages (Hanzel, 1959).

Of the 28 lake samples (Table 2), 10 were in the low conductivity classification. Two of the latter, Miner Lake and Reservoir Lake had fast growth. Average calculated length at the second annulus was 7.1 inches for Miner Lake and 7.2 inches for Reservoir Lake.

Rainbow trout lakes were inadequately represented in this study. All nine were in the high conductivity-fast growth category. Although Montana has many high mountain lakes containing slow growing rainbow trout populations, none were included in the tabulations because of inaccessibility during the time available or because of inadequate growth data.

Table 2 - Trout growth rate in relation to conductivity in 28 Montana lakes

Species	High Conductivity		Low Conductivity		Totals
	Slow growth	Fast growth	Slow growth	Fast growth	
Brook trout	0	1	4	2	7
Brown trout	0	5	0	0	5
Rainbow trout	0	9	0	0	9
Cutthroat trout	1	2	4	0	7
Totals	1	17	8	2	28

Similarly, the brown trout lake samples were also all in the high conductivity-fast growth category and no high mountain lakes were represented. However, brown trout are rare in Montana's mountain lakes.

Slow growth was associated with high conductivity in 37 stream samples and one lake sample. Factors that might restrict growth rate of trout in the presence of an apparent abundance of mineral fertility are: paucity of certain essential minerals, competition with other fish species, overstocked with hatchery trout, high altitude, siltation, pollution, physical habitat destruction, dewatering, etc.

Recommendations:

Specific conductance may be used as an aid to classification and management of trout waters if the limitations are considered. Values of 150 micromhos or less indicate low mineral fertility and slow trout growth. Higher readings do not necessarily mean high fertility or good trout growth. However, where slow trout growth is associated with apparent high mineral content it would be advisable to determine the cause of the poor growth rate. Rehabilitation through removal of competing species or habitat improvement might be indicated in such situations.

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Prepared by Jack E. Bailey Approved by _____
Date April 26, 1961 George D. Holton



Appendix:

Average calculated lengths at the second annulus, specific conductance in micromhos, and locations of 36 rainbow trout samples.

Water	Drainage	Specific Conductance (micromhos)	Average Calculated Total Length
East Boulder River	Yellowstone	193	4.9
Rock Creek	Big Hole	103	5.1
Big Sandy Creek	Milk	405	5.1
Clear Creek	Milk	570	5.2
W. Fk. Rock Creek	Yellowstone	79	5.3
Flint Creek	Clark Fork	194	5.3
W. Fk. Stillwater River	Yellowstone	239	5.5
Judith River	Missouri	532	5.5
E. Rosebud Creek	Yellowstone	38	5.6
W. Rosebud Creek	Yellowstone	40	5.7
Boulder River	Yellowstone	275	5.9
Sheep Creek	Missouri	290	6.0
Ruby River	Beaverhead	608	6.1
Gallatin River 3	Gallatin	310	6.1
Rock Creek	Clark Fork	313	6.4
Eagle Creek	Missouri	394	6.5
Gallatin River 2	Gallatin	310	6.5
Brider Creek	Gallatin	479	6.6
Prickley Pear Creek	Missouri	327	6.6
Sun River	Sun	810	6.8
Smith River	Missouri	479	6.9
Blackfoot River	Blackfoot	275	7.1
Gallatin River 1	Gallatin	381	7.4
Stillwater River	Yellowstone	242	7.7
Missouri River	Missouri	326	7.9
Madison River	Madison	298	9.4
Blaine Spring Creek	Madison	383	10.4
Willow Creek Reservoir	Jefferson	245	7.9
Francis Lake	Marias	359	8.2
Holter Dam	Missouri	315	8.6
Ennis Lake	Madison	275	8.8
Dailey Lake	Yellowstone	620	9.2
Hebgen Lake	Madison	312	9.3
Georgetown Lake	Clark Fork	199	9.7
Kipp Lake	Marias	660	14.5
Duck Lake	St. Mary's River	600	16.8

Appendix:

Average calculated lengths at the second annulus, specific conductance in micromhos, and locations of 15 cutthroat trout samples.

Water	Drainage	Specific Conductance (micromhos)	Average Calculated Total Length
Clearwater River	Blackfoot	165	4.6
Upper Willow Creek	Clark Fork	66	5.1
Middle Fk. Flathead River	Flathead	197	5.2
O'Brien Creek	Kootenai	180	5.3
Placid Creek	Blackfoot	90	5.4
Miller Creek	Bitterroot	229	5.5
Ranch Creek	Clark Fork	40	5.8
Gallatin River 3	Gallatin	310	6.9
Placid Lake	Blackfoot	116	5.0
Salmon Lake	Blackfoot	139	5.3
Seeley Lake	Blackfoot	86	6.1
Inez Lake	Blackfoot	133	6.3
Rainy Lake	Blackfoot	220	6.4
Alva Lake	Blackfoot	163	7.1
Georgetown Lake	Clark Fork	199	9.4

Appendix:

Average calculated lengths at the second annulus, specific conductance in micromhos, and locations of 26 brook trout samples.

Water	Drainage	Specific Conductance (micromhos)	Average Calculated total length
Big Hole River 2	Big Hole	72	4.2
Bloody Dick Creek	Beaverhead	36	4.3
Placid Creek	Blackfoot	90	5.0
O'Brien Creek	Kootenai	180	5.3
Big Hole River 1	Big Hole	51	5.4
Sheep Creek	Missouri	259	5.6
Trail Creek	Big Hole	62	5.7
Clear Creek	Milk	570	5.7
Beaver Creek	Milk	361	5.7
Miner Creek	Big Hole	23	5.8
Big Elk Creek	Musselshell	978	5.9
West Fk. Rock Creek	Yellowstone	79	6.3
Taylor Creek	Beaverhead	270	6.4
Brider Creek	Gallatin	479	6.6
Smith Creek	Flathead	215	6.8
Rock Creek	Clark Fork	313	6.8
Prickley Pear Creek	Missouri	329	7.0
Elkhorn Creek	Missouri	486	7.2
Gallatin River	Gallatin	381	8.5
Placid Lake	Blackfoot	116	5.2
Browne Lake	Big Hole	64	5.2
Kilbrennan Lake	Kootenai	51	6.0
September Horn Lake	Yellowstone	27	6.4
Miner Lake	Big Hole	23	7.1
Reservoir Lake	Beaverhead	32	7.2
Holiday Lake	Musselshell	324	8.8

Appendix:

Average calculated lengths at the second annulus, specific conductance in micromhos, and locations of 23 brown trout samples.

Water	Drainage	Specific Conductance (micromhos)	Average Calculated total length
Little Blackfoot River	Clark Fork	217	5.7
West Boulder River	Yellowstone	156	5.7
West Rosebud Creek	Yellowstone	40	5.8
Boulder River	Yellowstone	275	5.9
Last Boulder River	Yellowstone	402	6.7
W. Fk. Stillwater River	Yellowstone	239	6.7
Rock Creek	Yellowstone	51	6.8
Stillwater River	Yellowstone	242	6.9
Shields River	Yellowstone	413	7.2
Big Elk Creek	Musselshell	978	7.6
Frickley Bear Creek	Missouri	329	7.7
Little Blackfoot River	Clark Fork	309	7.9
Missouri River	Missouri	326	8.1
Ruby River	Beaverhead	608	8.5
Madison River	Madison	298	8.7
Gallatin River 1	Gallatin	381	8.8
Rock Creek	Clark Fork	313	9.9
Blaine Spring Creek	Madison	383	10.3
Willow Creek Reservoir	Jefferson	245	8.3
Holter Dam	Missouri	315	9.0
Ennis Lake	Madison	275	10.1
Canyon Ferry Reservoir	Missouri	344	10.4
Hebgen Lake	Madison	245	10.8





MONTANA FISH AND GAME DEPARTMENT
FISHERIES DIVISION
HELENA, MONTANA

JOB COMPLETION REPORT
INVESTIGATIONS PROJECTS

State of Montana

Project No. F-23-R-4 Name Fishery Investigation Laboratory

Job No. I & II Title Age & Growth Studies & Analysis
of Bottom Samples in Connection
With Pollution Studies

Period Covered: May 1, 1960 to April 30, 1961

Abstract:

Over 9,000 fish scale samples were processed in the laboratory during 1960-61. A summary is presented showing the average growth rates of the larger collections aged at the laboratory.

Objectives:

In formulating a sound fisheries management program it is necessary to know the growth rates and ages of the fish populations. This laboratory provides facilities for processing scale samples, determining age and growth and maintaining files of age and growth data. The laboratory location allows utilization of well trained student laboratory assistants in both scale work and in the tedious analysis of bottom samples.

Techniques and Findings:

During 1960-61 over 9,000 scale samples were entered in the accession records of the laboratory. All but a few small collections were aged during this period. These collections represent initial survey data, collections made in evaluating management techniques and special studies concerning life histories and ecology. Three large collections were mounted for special graduate research studies and will be aged by the project leaders. In addition several large collections including fish from mountain lakes, streams, and reservoirs were mounted and returned to project biologists for age analysis.

Work is in progress in placing the age and growth data on cards for easy reference.

A summary of the more significant samples aged during 1960-61 are presented in Table I.

No significant benthos analysis work was done during the year.

Table I - Summary of Age and Growth Studies For 1960-61.

Rainbow Trout

	I	II	III	IV	V	VI
Ajax Lake	3.5(19)	.				
Belt Creek	3.0(46)	5.6(27)	10.0(3)			
Big Cherry Creek	2.6(12)	4.0(3)				
Big Spring Creek	4.6(56)	11.4(28)	14.9(13)	17.5(2)		
Cut Bank Creek	2.6(25)	6.5(25)	10.5(21)	13.0(4)	15.8(1)	
Diamond Lake	1.9(9)	5.7(9)				
Dry Fork Marias River	2.2(11)	8.8(11)	12.0(8)			
East Fork Reservoir	3.0(29)	9.0(28)	13.5(16)	17.6(4)		
Eureka Lake	11.7(31)					
Fisher River	2.0(28)	5.3(2)				
Georgetown Lake	3.1(149)	6.8(148)	9.4(94)	15.2(7)	22.7(1)	
Gibson Reservoir	3.2(16)	8.1(16)	11.2(10)	14.6(1)		
Holiday Lake	3.6(53)	7.9(44)	12.4(26)	20.4(1)		
Kuhr-Newhouse Res. #6	2.8(39)	6.1(26)	8.7(18)			
Little Big Horn River	3.6(20)	6.1(19)	9.0(1)			
Marias River	3.3(35)	9.6(32)	12.1(21)	12.2(1)		
Martin Creek	3.2(20)	8.4(7)	10.9(2)			
McDonald Pond	4.0(9)	6.8(2)	18.2(1)			
Miller Reservoir #6	2.7(38)					
Mission Lake	2.9(33)	8.4(33)	12.9(5)	16.1(1)		
Ottesen Reservoir	2.9(12)	9.6(12)	12.3(12)			
Pipe Creek	2.5(73)	4.9(19)				
Prospect Creek	2.7(11)	4.6(4)	6.2(1)			
Rock Creek	2.9(118)	6.4(40)	10.2(17)	12.1(5)	14.8(3)	
Sheep Creek	2.7(40)	6.0(29)	8.2(8)			
Tenderfoot Creek	2.7(86)	5.3(77)	7.7(39)	9.5(12)	12.1(4)	
Tiber Reservoir	8.3(233)	11.7(225)	12.6(79)	13.7(6)		
Upper Ulreys Lake	2.4(35)	6.1(35)	9.1(27)	11.0(16)	12.9(3)	
West Fisher River	2.4(23)	4.4(5)				
Whits Lake	3.5(27)	8.8(27)	13.0(11)	17.6(3)	19.4(2)	21.1(1)
Woodward Lake	2.8(21)	5.8(21)	9.8(19)	13.0(13)	14.6(8)	

Cutthroat Trout

Albino Lake	2.9(74)	6.6(70)	10.7(28)	14.4(7)	
Avalanche Lake	2.8(10)	6.9(10)			
Bear Lake	2.8(16)	6.6(16)	11.0(16)	14.3(1)	
Darkhorse Lake	4.2(15)	6.7(11)	9.6(9)		
Flower Creek	2.5(17)	4.5(15)	6.4(8)	9.2(1)	
Georgetown Lake	2.5(111)	6.1(111)	9.8(99)	12.8(53)	14.0(1)
Holiday Lake	3.9(14)	9.9(14)	16.0(3)	12.5(1)	
Little Blackfoot River	3.1(19)	5.8(16)	7.2(1)		
Lower Spanish Lake	3.1(15)	6.3(13)	10.3(9)	13.4(3)	
Martin Creek	2.8(24)	5.8(5)	9.3(1)		
Nine Mile Creek	2.1(77)	4.3(37)	6.9(11)	9.3(6)	11.1(1)
O'Brian Creek	3.4(25)	5.4(15)	9.1(3)		
Postal Creek	3.3(8)	6.1(7)	8.2(3)		
Prospect Creek	1.9(13)	4.2(9)	7.1(2)	10.4(1)	
Ramshorn Lake					
Rock Creek	2.9(29)	5.1(9)	10.6(1)		
Solitude Lake	3.0(21)	5.8(21)	8.1(15)	9.7(2)	
Summit Lake	3.9(16)	8.0(16)	11.3(11)	13.2(4)	

Table I - Cont'd.

Whitefish

	I	II	III	IV	V	VI
Belt Creek	3.3(27)	6.4(24)	9.3(22)	11.1(18)	12.4(11)	13.8(4)
Canyon Ferry Reservoir	VII-15.4(2)	VIII-17.3(1)				
Cutbank Creek	3.9(10)	7.0(10)	9.7(8)	11.9(7)	12.8(4)	13.7(3)
Hungry Horse Reservoir	VII-14.0(1)					
Nine Mile Creek	3.7(33)	7.0(32)	9.6(21)	10.7(5)		
Prospect Creek	3.4(18)	7.4(18)	9.6(15)	10.9(10)	10.7(1)	
Rock Creek	2.7(9)	5.2(8)	7.8(7)	10.4(2)		
Sheep Creek	2.6(16)	5.4(23)	7.3(2)			
Smith River	2.8(377)	6.2(209)	8.8(168)	10.6(94)	12.4(49)	13.5(28)
	VII-13.9(16)	VIII-16.7(3)	IX-17.4 (1)			
	3.2(15)	6.2(14)	8.3(3)			
	3.7(76)	7.4(63)	9.4(27)	10.6(17)	11.7(6)	12.9(2)

Large Mouth Bass

Kicking Horse Reservoir	2.0(17)	5.2(17)	6.4(14)	7.6(3)		
Ninepipe Reservoir	3.1(107)	7.1(107)	10.9(107)	12.6(84)	13.8(62)	14.7(30)
	VII-15.8(25)	VIII-16.6(16)	IX-17.0(3)	X-17.5(3)		
	XI-17.9(1)					

Bluegill

Killens Reservoir	1.4(14)	2.9(14)	4.1(14)	5.3(14)	6.0(13)	6.4(4)
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Walleye

Dybas Reservoir	3.9(9)	8.4(9)	11.8(9)	15.1(9)	18.9(2)	20.3(2)
Killens Reservoir	3.1(18)	6.7(18)	12.0(12)	16.0(12)	17.6(7)	
Milk River	5.1(16)	11.8(9)	16.9(4)	22.1(2)	24.2(2)	
Whiteside Pond	5.3(22)	9.1(22)				

Yellow Perch

Bynum Reservoir	1.4(63)	3.0(63)	4.1(63)	6.7(40)	7.9(9)	9.9(2)
Canyon Ferry Reservoir	VII-11.6(1)					
Fort Peck Reservoir	2.3(146)	4.8(146)	6.7(124)	8.1(75)	9.0(54)	9.8(19)
Milk River	VII-11.2(4)					
	2.1(50)	4.7(48)	6.9(7)	8.4(1)		
	2.1(21)	3.8(12)	5.6(3)			

Common Suckers

Bynum Reservoir	1.7(51)	5.0(51)	9.1(48)	12.4(34)	14.5(18)	15.2(7)
Canyon Ferry Reservoir	VII-15.9(2)	VIII-16.0(1)				
Hungry Horse Reservoir	2.1(164)	5.2(164)	7.9(138)	10.2(115)	11.5(84)	12.3(19)
Kellenbeck Reservoir	2.0(22)	4.5(22)	7.6(21)	10.4(18)	11.4(5)	
McDonald Pond	1.2(10)	3.9(10)	7.9(9)	10.7(9)	11.9(3)	
Mission Lake	1.8(19)	5.7(9)	10.6(9)	13.2(6)		
Tiber Reservoir	1.6(32)	5.5(32)	10.8(26)	13.8(21)	15.3(3)	16.4(1)
	VII-16.9(1)					
	2.8(280)	8.4(246)	10.5(42)			

Table I - Cont'd.

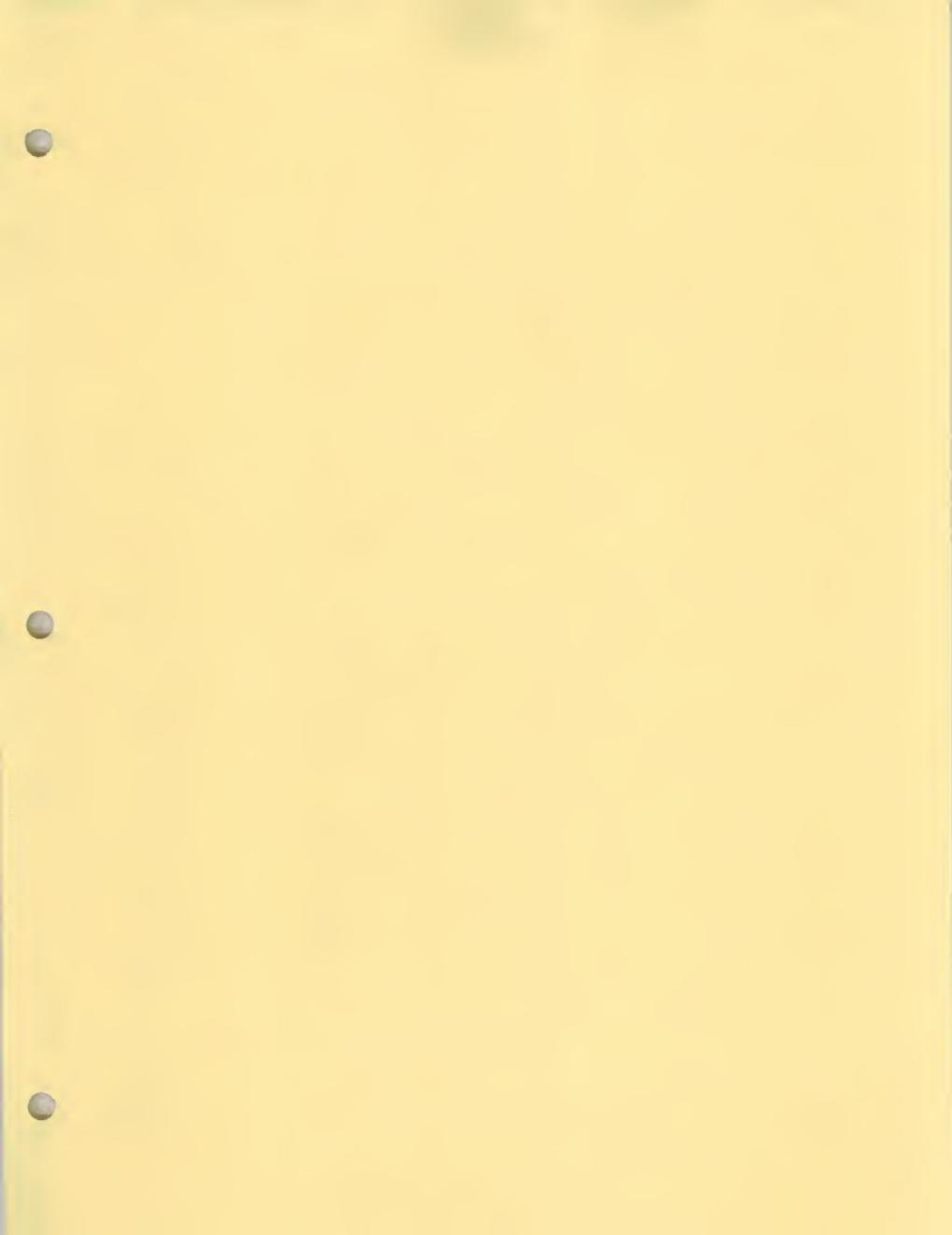
	I	II	III	IV	V	VI
Thompson Lake	3.6(27)	6.7(27)	9.8(20)	11.5(4)		
Upper Falls Creek Lake	2.8(14)	6.4(14)				
Vermillion River	2.0(9)	4.3(6)	6.9(1)			
<u>Brown Trout</u>						
Canyon Ferry Reservoir	3.7(49)	8.3(49)	13.6(43)	16.4(32)	18.4(18)	19.1(6)
Gallatin River	3.9(47)	9.0(36)	13.7(12)	16.0(5)	VII - -	22.9(2)
Hound Creek	3.8(46)	9.0(17)	13.4(6)	18.4(1)		
Little Bighorn River	3.3(18)	6.9(5)	8.0(1)			
Musselshell River	3.4(50)	8.0(42)	12.4(11)	15.7(4)		
Smith River	3.7(23)	8.9(7)				
<u>Eastern Brook Trout</u>						
Georgetown Lake	3.2(51)	7.2(51)	11.2(30)	15.1(2)		
Holliday Lake	4.1(58)	8.4(57)	11.0(37)			
Martin Creek	3.3(14)	5.6(1)				
Nine Mile Creek	2.8(20)	5.2(13)	7.8(3)			
O'Brian Creek	3.4(14)	6.1(5)	9.2(1)			
Prospect Creek	2.8(55)	4.4(23)	6.0(5)			
Riebe Reservoir	4.5(15)	10.1(14)	13.9(1)	16.9(1)		
Rock Creek	3.6(10)	6.1(6)				
Shonkin Creek	3.5(91)	6.0(18)	7.1(1)			
West Fork Sun River	2.7(10)	5.3(10)	7.3(3)			
<u>Dolly Varden</u>						
East Fork Reservoir	3.1(34)	6.9(34)	10.6(25)	14.7(4)		
Flower Creek	2.1(8)	3.8(7)	5.2(5)			
Hungry Horse Reservoir	2.9(39)	5.6(39)	9.4(38)	13.9(23)	17.3(7)	
Rock Creek	3.1(23)	6.2(23)	9.0(16)			
<u>Grayling</u>						
Agnes Lake Big Hole	4.7(19)	10.8(19)	13.6(12)	15.2(5)	16.0(2)	
<u>Fine Scale Sucker</u>						
Canyon Ferry Reservoir	2.0(69)	4.6(69)	7.6(69)	9.7(42)	11.2(18)	9.8(1)
Georgetown Lake	1.0(29)	3.1(29)	6.3(28)	8.8(13)	10.4(5)	VII - - 10.5(1)
Hungry Horse Reservoir	2.0(21)	5.0(21)	7.6(21)	8.9(11)	9.5(3)	
Tiber Reservoir	2.7(16)	7.0(16)	9.9(11)	11.5(3)		
<u>Goldeye</u>						
Fort Peck Reservoir	4.2(17)	7.5(13)	10.8(5)	12.6(4)	13.3(3)	14.0(2)
<u>Squawfish</u>						
Hungry Horse Reservoir	1.8(20)	3.7(29)	6.9(29)	8.7(17)	10.4(4)	

Recommendations:

Collection and analysis of fish scales for age and growth should continue with attention devoted to collecting adequate samples from the important waters. Work on assembling age and growth data should reach a state this year where we will be able to evaluate the weak areas in the collections.

Prepared by John R. Heaton Approved by George D. Holton
Date April 27, 1961
George D. Holton







MONTANA DEPARTMENT OF FISH AND GAME
FEDERAL AID IN FISH RESTORATION SECTION
HELENA, MONTANA

STATE DOCUMENTS COLLECTION

APR 1 1960

JOB COMPLETION REPORT
INVESTIGATIONS PROJECTSMONTANA STATE
1515 E. 6th
HELENA, MONTANAState of Montana
Project No. F-23-R-3
Job No. IIIName Fishery Investigation LaboratoryTitle A Study of the Relationships Between Total
Dissolved Solids and Trout Growth RatePeriod Covered: May 1, 1959 to April 30, 1960Abstract:

Brook, brown, rainbow and cutthroat trout age and growth data representing 51 streams and 37 lakes were tabulated and ranked according to average calculated total length at the second annulus. The samples depict trout growth rates in a wide variety of habitat types in 15 of the 17 major Montana drainages. Average total length at the second annulus roughly ranged from 5 to 10 inches but the extreme variation was from 4.5 inches for brook trout in a small mountain stream to 16.8 inches for rainbow trout in a prairie lake.

Total dissolved solids content will be determined in 1960 for all waters represented by growth data. A portable resistivity meter will be used to make the dissolved solids readings in the field. A statistical method of rank correlation will then be employed to decide whether dissolved solids can be used as an aid to classification of waters into broad productivity types.

Objectives:

In the management of trout lakes, it is desirable to classify the waters according to various readily assessed factors. For example, the number of trout needed to adequately stock a 20-acre cirque lake in a wilderness area is quite different from the number needed to stock a 20-acre pond in the fertile lowlands of more populous areas in Montana. Relative ease of access or proximity to population centers, presence or absence of spawning areas, relative abundance and size of predators or competitors, and relative size and shape of the lake basin can usually be determined accurately enough for management purposes during one or two days of observing and collecting at the lake. Another important factor, potential productivity of catchable game fish, is not so easily assessed.

There is available evidence to indicate that dissolved mineral content can be used to classify lakes into broad categories that are somewhat indicative of potential productivity. Rawson (1951) stated that "A positive correlation was found between the total solids in the water and the average standing crops of plankton and bottom fauna," and that "Recent studies in lakes of northwestern Canada suggest that the total mineral content of waters provides a rough indicator of edaphic conditions which must in some measure affect the productivity of lakes." Larkin and Northcote (1958) are quoted as follows: "In applying our findings to a scheme of lake typology for British Columbia, we would consider only the overriding significance of total dissolved solid content as an index of production. Bearing in mind that T.D.S. (total dissolved solids) summarizes aspects of both the substrate and the climate as well as their interaction, it should be the best single indicator of a large portion of the physical environment."

PLEASE RETRIEVE

Recent developments in portable conductivity meters (Edmondson, W. T., 1956) make the electrolyte method of determining T.D.S. appear very attractive to fishery workers. Lennon (1959) reported on the wide applicability of electrical resistivity meters to fishery work and presented data that illustrated a close relationship between resistivity and T.D.S. Electrolyte measurements eliminate the problem of varying contents of suspended matter. This was a factor in rendering T.D.S by evaporation useless as an index to lake productivity in Minnesota (Moyle, 1946). Moyle also stated that the wide carbonate-sulphate ratio of Minnesota waters presented further difficulties in the use of T.D.S. While this will undoubtedly also be a factor in Montana, much chemical analysis data is already available to indicate where the high sulphate waters are located. High T.D.S. readings due to sulphates and other nonproductive minerals can therefore be given less importance particularly if biological data is available to support interpretations.

A tremendous volume of age and growth data from scale analysis has been accumulated in Montana during the past decade. Age and growth data on portions of the Gallatin drainage was published by Purkett (1951) and on the Missouri River by Kathrein (1951). Most of the growth data however, was collected and analyzed by Fish and Game Department biologists for use in management of the sport fishery; such data has appeared previously in Completion Reports for federal aid projects. Growth of trout can be limited by certain factors such as overstocking which are not reflected in T.D.S. readings, however, Reimers et al (1955) found a fair degree of correlation between trout growth and dissolved solids content of 10 alpine lakes. It is proposed that available growth data and chemical analysis be used to supplement T.D.S. readings as an aid to the classification of Montana waters into broad fertility or potential productivity types.

Techniques Used:

Whitney and Carlander (1956) stated that "For general surveys and many management purposes growth approximations using the direct proportion computations are probably sufficiently accurate...". The direct proportion method of back calculation of total lengths at each annulus was used in all age and growth work with fish scales at the Bozeman fishery laboratory. For the purposes of this study, only those samples were considered in which there were at least 25 calculated lengths available to determine average length at the second annulus. The average calculated total length at the second annulus was then used to rank the various waters according to trout growth rate. There is a wide variation in average length of trout at their second annulus and size of fish at this age have very significant management implications. It is at this age that the majority of trout attain catchable size (6 inches or larger). It is sometimes difficult to obtain adequate samples of older fish so that average size at the third annulus would often be based on too few length calculations.

Preliminary tests were made with a resin chloride exchange method of determining T.D.S. but this method was abandoned in favor of the electrolyte method which is becoming standard among fishery workers and which will yield accurate readings in the field. The meter was not purchased in time to make T.D.S. determinations in 1959 so that this part of the investigation is scheduled for the 1960 summer season. The meter to be used is the Bouyoucos BN-2 moisture meter modified for fishery workers. Streams as well as lakes will be tested for T.D.S. content as preliminary study indicates a positive correlation between trout growth and T.D.S. of streams. A great deal of seasonal fluctuation in mineral content of certain Montana waters has been observed (F-13-R Comp. Reports). Therefore, all T.D.S. readings to be used as fertility indices will be measured during the main trout growing season which occurs after the spring or early summer spates.

The method of rank correlation described by Snedecor (1956) will be used to determine whether T.D.S. rankings of trout waters are in agreement with rankings by calculated length of trout at the second annulus.

Findings:

Average calculated lengths at the second annulus were determined for brook, brown, rainbow and cutthroat trout samples taken from 51 streams and 37 lakes in 15 of the 17 major Montana drainages. Average lengths at the second annulus roughly range from 5 to 10 inches for all species. The brook trout samples (Table I) show a range in average length at the second annulus of 4.5 - 8.5 inches in streams and 5.2 - 10.0 inches in lakes. Apparently the full range of habitat types inhabited by this species is fairly well represented in these samples.

The brown trout samples (Table 2) show a similar range in average lengths for streams, 5.7 - 10.3 inches but a range of only 8.4 - 10.9 inches for lakes. All of the brown trout lake samples were from the Madison-Missouri series of reservoirs and adequate samples from other habitat types would be desirable for this study. Actually, few Montana lakes contain large numbers of brown trout.

The range of average lengths for rainbow trout (Table 3) in streams was 4.8 - 10.4 inches and the range in lakes was 6.2 - 16.8 inches. Many high mountain lakes in Montana have rainbow trout populations but none were represented by adequate scale samples according to criteria used in this study. The 14.5 inches and 16.8 inches average lengths for Kipp Lake and Duck Lake respectively are of great interest in that recently developed lake planting tables fell far short of the former stocking rates for these or similar lakes. This investigation into potential trout productivity of lakes may yield much needed information on the classification and management of such highly productive lakes.

The cutthroat trout samples (Table 4) appear to represent the full range of habitat types available to this species. The range in average length for cutthroat trout in streams is only 4.6 - 6.3 inches but this is to be expected since this species is found in large numbers only in the headwater portions of Montana drainages (Hanzel, 1959).

Total dissolved solids content will be determined in 1960 for each of the 51 streams and 37 lakes represented in these tables. Rank correlation will then be used to determine whether T.D.S. can be used as an aid in classifying waters into trout productivity types.

Recommendations:

Growth data representing a wide range of habitat types occupied by brook, brown, rainbow and cutthroat trout have been tabulated. It is recommended that the total dissolved solids content of these waters be determined in the field by use of an electrical resistivity meter so that the study of relationships between trout growth rate and mineral content of water can be completed.

TABLE 1

Brook trout samples ranked by average calculated length at second annulus (inches)

<u>Water</u>	<u>Drainage</u>	<u>Year</u>	<u>Number of fish aged</u>	<u>Number of lengths Calculated</u>	<u>Average lengths at 2nd annulus</u>
<u>Streams</u>					
Bloody Dick Cr.	Beaverhead	1953	42	37	4.5
Placid Cr.	Clark Fk.	1950	293	172	4.6
Trail Cr.	Big Hole	1959	52	32	5.6
O'Brien Cr.	Kootenai	1950	258	94	5.7
Big Hole Riv.	Big Hole	1959	50	27	5.7
Clear Cr.	Milk	1957	107	45	5.9
W. Fk. Rock Cr.	Yellowstone	1950	105	28	6.3
Taylor Cr.	Beaverhead	1952	31	30	6.4
Bridger Cr.	Gallatin	1948	86	53	6.6
Rock Cr.	Clark Fk.	1959	62	26	6.8
Elkhorn Cr.	Missouri	1952	28	26	7.2
Smith Cr.	Flathead	1951	57	53	7.3
Gallatin R.	Gallatin	1948	71	63	8.5
<u>Lakes</u>					
Browne L.	Big Hole	1959	32	32	5.2
Silver L.	Clark Fk.	1958	55	55	5.5
Kilbrennan L.	Kootenai	1956	47	44	5.6
Sept. Morn L.	Yellowstone	1949	38	37	6.4
Slide Rock L.	Yellowstone	1949	28	28	6.5
Miner L.	Big Hole	1959	25	25	7.1
Reservoir L.	Beaverhead	1959	59	41	7.2
Moore L.	Clark Fk.	1958	46	27	7.3
Holiday L.	Musselshell	1958	71	57	8.8
McDonald Pond	Beaverhead	1955	64	34	9.8
Widows Pool	Beaverhead	1955	100	48	10.0

TABLE 2

Brown trout samples ranked by average calculated
total length at second annulus (inches)

Water	Drainage	Year	Number of fish aged	Number of lengths calculated	Average length at 2nd annulus
<u>Streams</u>					
Little B'foot R.-Upper	Clark Fk.	1959	117	91	5.7
W. Boulder R.	Yellowstone	1958	65	28	5.7
W. Rosebud Cr.	Yellowstone	1948	51	51	5.8
Bluewater Cr.	Yellowstone	1952	47	34	6.5
E. Boulder R.	Yellowstone	1958	56	27	6.7
W. Fk. Stillwater	Yellowstone	1952	44	37	6.7
Rock Cr.	Yellowstone	1952	68	39	6.8
Stillwater R.	Yellowstone	1948	51	47	6.9
Boulder R.	Yellowstone	1948	37	33	6.9
Shields R.	Yellowstone	1950	176	95	7.2
Big Elk Cr.	Musselshell	1951	118	51	7.6
Prickley Pear Cr.	Missouri	1949	570	269	7.8
Little B'foot R.-Lower	Clark Fk.	1959	99	31	7.9
Ruby R.	Beaverhead	1953	44	30	8.5
Madison R.	Madison	1950	163	144	8.7
Gallatin R.	Gallatin	1949	102	97	8.8
Missouri R.	Missouri	1949	127	103	8.9
o. Fk. Madison	Madison	1950	53	53	9.1
Rock Cr.-Lower	Clark Fk.	1959	115	93	9.9
Odell Cr.	Beaverhead	1951	89	39	10.0
Blaine Spring Cr.	Madison	1951	56	23	10.3
<u>Lakes</u>					
Willow Cr. Res.	Madison	1955	55	55	8.4
Ennis L.	Madison	1950	32	32	10.1
Canyon Ferry Res.	Missouri	1958	67	67	10.4
Hebgen L.	Madison	1950	101	97	10.6
Hebgen L.	Madison	1950	135	135	10.9
Holter Dam	Missouri	1948	39	28	9.0

TABLE 3

Rainbow trout samples ranked by average calculated
total length at second annulus (inches)

Water	Drainage	Year	Number of fish aged	Number of lengths calculated	Average length at 2nd annulus
<u>Streams</u>					
E. Boulder R.	Yellowstone	1950	134	80	4.8
Rock Cr.	Big Hole	1959	37	33	5.1
Big Sandy Cr.	Milk	1958	47	26	5.1
Clear Cr.	Milk	1957	33	27	5.2
W. Fk. Rock Cr.	Yellowstone	1950	225	116	5.3
Flint Cr.	Clark Fk.	1953	64	52	5.3
W. Fk. Stillwater	Yellowstone	1950	40	30	5.5
Judith River	Missouri	1951	53	33	5.5
E. Rosebud Cr.	Yellowstone	1948	40	38	5.6
W. Rosebud Cr.	Yellowstone	1948	30	29	5.7
Boulder R.	Yellowstone	1948	84	68	5.9
Ruby R.	Beaverhead	1953	55	40	6.1
Prickley Pear Cr.	Missouri	1949	333	170	6.4
Eagle Cr.	Missouri	1958	41	27	6.5
Bridger Cr.	Gallatin	1948	98	77	6.6
Rock Cr. Lower	Clark Fk.	1959	47	41	6.6
Sheep Cr.	Missouri	1951	188	66	6.8
Sun R.	Sun	1952	94	89	6.8
Smith R.	Missouri	1952	35	25	6.9
Rock Cr. Upper	Clark Fk.	1959	166	138	6.9
Blackfoot R.	Clark Fk.		48	36	7.1
W. Gallatin R.	Gallatin	1948	65	50	7.2
Gallatin R.	Gallatin	1949	142	126	7.4
Stillwater R.	Yellowstone	1948	49	47	7.7
Missouri R.	Missouri	1949	478	371	7.9
Sheep Cr.	Beaverhead	1953	56	31	8.2
Madison R.	Madison	1950	201	148	9.4
Blaine Spring Cr.	Madison	1951	92	32	10.4
<u>Lakes</u>					
Willow Cr. Res.	Yellowstone	1959	56	56	6.2
Francis Lake	Marias	1948	40	39	8.2
Holter Dam	Missouri	1948	238	145	8.6
Ennis Lake	Madison	1950	114	105	8.8
Hebgen Lake	Madison	1950	112	112	9.1
Willow Cr. Res.	Madison	1955	69	69	9.1
Dailey L.	Yellowstone	1955	141	141	9.2
Hebgen L.	Madison	1950	272	272	9.4
Georgetown L.	Clark Fk.	1950	93	93	9.7
McDonald Pond	Beaverhead	1955	72	44	10.4
Kipp Lake	Marias	1959	46	32	14.5
Duck Lake	St. Mary's	1955	26	26	16.8

TABLE 4

Cutthroat trout samples ranked by average calculated total length at second annulus (inches)

Water	Drainage	Year	Number of fish aged	Number of lengths calculated	Average length at 2nd annulus
<u>Streams</u>					
Clearwater R.	Clark Fk.	1957	41	25	4.6
Meadow Cr.	Bitterroot	1952	63	51	4.9
So. Fk. Skalkaho	Bitterroot	1952	28	25	5.0
Rock Cr. Upper	Clark Fk.	1959	102	41	5.0
W. Fk. Rock Cr.	Clark Fk.	1956	43	38	5.0
Upper Willow Cr.	Clark Fk.	1948	58	48	5.1
Mid. Fk. Flathead	Flathead	1956	32	32	5.2
O'Brien Cr.	Kootenai	1950	87	41	5.3
Placid Cr.	Clark Fk.	1950	84	44	5.4
Miller Cr.	Bitterroot	1959	53	33	5.5
Rock Cr. Lower	Clark Fk.	1959	72	70	5.7
Hughes Cr.	Bitterroot	1952	53	34	5.8
Ranch Cr.	Clark Fk.	1959	60	40	5.8
Crooked Cr.	Yellowstone	1950	31	31	6.3
<u>Lakes</u>					
Neasel Lake	Kootenai	1957	46	45	4.5
Therriault L.	Kootenai	1957	30	26	4.7
U. Elliot L.	Clark Fork	1959	49	49	4.9
L. Fish Lake	Flathead	1956	41	38	5.0
Cedar Lake	Flathead	1956	26	25	5.0
Placid Lake	Clark Fork	1956	29	29	5.0
Mid. Thompson L.	Clark Fork	1956	29	29	5.2
U. Wolverine L.	Kootenai	1957	27	27	5.3
Salmon L.	Clark Fk.	1948	26	26	5.3
Seeley L.	Clark Fk.	1948	52	52	6.1
Inez Lake	Clark Fk.	1948	70	65	6.3
Medicine Lake	Clark Fk.	1956	40	35	6.3
Rainy L.	Clark Fk.	1948	100	75	6.4
Parker L.	Clark Fk.	1959	58	57	6.7
Alva L.	Clark Fk.	1948	76	56	7.1
Webb Lake	Clark Fk.	1959	31	31	7.6
Georgetown L.	Clark Fk.	1958	124	119	9.4

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Data and Reports:

The original data and reports are in the Project Leader's file, c/o Z & E Dept.,
Montana State College, Bozeman, Montana

Prepared by: Jack E. Bailey
Date April 22, 1960

Approved by George D. Holton





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#5

MONTANA DEPARTMENT OF FISH AND GAME
FEDERAL AID IN FISH RESTORATION SECTION

Helena, Montana

JOB COMPLETION REPORT
INVESTIGATIONS PROJECTS

State of Montana

Name Fishery Investigation Laboratory

Project No. F-23-R-3

Title Age & Growth Studies & Analysis of
Bottom Samples in Connection with
Pollution Studies

Job No. I & II

Period Covered: May 1, 1959 to April 30, 1960

Abstract:

Age growth studies were made on over 5,000 scale samples. The age-growth data were summarized and the data placed on cards for easy access. A total of 206 drift and bottom samples from the Bitterroot Drainage were sorted. Work is in progress on a series of bottom samples from the Madison River.

Objectives:

Age and growth of the fishes in the lakes and streams is used as a basis for management. Montana is still in the process of inventorying the fishery resource in some areas and age-growth studies are part of this inventory. In other situations a knowledge of the age of the fish and the rate of growth are a necessary part of evaluating management techniques. The tedious analysis of bottom samples collected in connection with pollution can best be accomplished in a laboratory where temporary help, with the necessary training, is available. Results of these analyses are sent to leaders of the specific projects on which the data was collected for inclusion in pertinent completion reports.

Techniques and Findings

During 1959-60 age and growth determinations were made on approximately 5,000 specimens. These collections represent initial survey information (Big Hole River Drainage, Sun River and mountain lakes) as well as follow up survey to evaluate management measures (Kipp Lake, Blackfoot River) and as a part of special studies (Madison River, Rock Creek, Beartooth Lakes). A summary of the significant collections, aged in the laboratory, is shown in Table I. In addition to these, several large collections were mounted by the laboratory and were aged as a part of other special studies.

Past years scale collections were summarized and the significant samples (over 10 of a species) were placed on cards for easy reference.

A series of 205 bottom and drift samples from the Bitterroot Drainage were separated to order, counted and volumes determined. These samples were collected as a part of a DDT spray program in the drainage. These data are included in the supplemental completion report for F-12-R-6.

During the low water following the August earthquake, samples of bottom fauna were taken from several sites on the Madison River. These data are summarized in Table II.

Recommendations:

Collection and analysis of fish scales for age and growth should continue with emphasis on securing adequate samples from the major waters. Work on organizing and tabulating these data should be completed and a summary prepared for the use of management biologists.

Prepared by John R. Heaton

Date September 27, 1960

Approved by George D. Holton
George D. Holton

Table I - Summary of Age and Growth Studies For 1959-60.

Eastern Brook Trout

	I	II	III	IV	V
Holiday Lake (1960)	5.0(33)	8.7(18)	10.8(2)		
Holiday Lake (1954-58)	4.3(71)	8.8(57)	12.1(13)		
Miner Creek (upper)	2.1(11)	4.3(11)	7.3(2)		
Miner Creek (lower)					
Joseph Creek	2.7(36)	5.0(16)			
N. Fk. Big Hole	3.6(19)	6.6(8)	9.6(2)	12.6(1)	
Browne Lake	2.4(32)	5.2(32)	7.8(17)	9.5(2)	
Trail Creek (upper)	2.9(52)	5.6(32)	7.3(10)	9.4(2)	
Trail Creek (middle)	3.5(16)	6.0(2)			
Steel Creek	4.0(17)	7.8(7)	11.1(1)		
Ruby Creek	3.0(30)	5.9(14)	8.6(3)		
Pattengail Creek	3.7(16)	4.6(3)			
LaMarche Creek	2.7(23)	4.9(15)	7.9(6)		
Twin Lake	3.2(16)	6.5(16)	9.0(7)		
Miner Lake	3.2(25)	7.1(25)	9.8(10)		
Deep Creek	3.2(19)	5.9(17)	8.7(2)	11.6(1)	
Mossigibrod Lake	2.7(8)	6.4(8)	9.6(5)	12.7(2)	
Wise River	3.1(12)	5.7(3)	8.6(1)		
Reservoir Lake	4.3(58)	7.2(41)	8.9(4)		
Pintlar Lake	3.1(12)	6.2(12)	8.0(5)		
Willow Creek	4.5(15)	6.6(6)			
Tin Cup Creek	3.6(15)	5.9(2)			
Lost Creek	3.0(21)	5.7(13)	7.2(1)		
Mill Creek	3.3(23)	5.4(6)			
Warm Spring Creek	3.1(10)	5.2(6)			
Rock Creek Sec. I	4.0(62)	6.8(26)	10.2(5)		
Little Blackfoot River	2.1(26)	3.7(10)	8.0(1)		
Bloody Dick Creek	2.3(38)	4.3(27)	5.8(9)		
Big Hole River	2.9(48)	5.4(25)	7.7(10)	9.4(2)	
Big Hole River	2.2(58)	4.2(38)	6.8(17)		

Rainbow Trout

Holiday Lake (1960)	3.7(12)	9.6(12)	13.7(6)	
Rock Island #1	3.7(19)	7.4(12)	9.7(5)	11.6(4)
Holiday Lake (1954-58)	3.7(10)	9.8(7)	14.7(3)	18.6(2)
Pattengail Creek	2.9(23)	5.9(2)	10.0(1)	
LaMarche Creek	2.2(11)	4.7(8)	6.6(2)	
Rock Creek	3.6(37)	5.1(33)	6.7(7)	8.9(2)
Deep Creek	2.3(12)	5.0(10)	7.1(2)	
Wise River	2.8(17)	5.3(1)	8.7(1)	11.9(1)
Sun River	3.3(94)	6.8(89)	8.7(29)	11.2(10)
Willow Cr. Res.	3.5(56)	6.2(56)	9.1(45)	11.1(14)
Nilan Reservoir	9.1(34)	14.1(9)		
Kipp Lake	4.7(46)	14.5(32)	21.0(27)	22.0(3)

Table I - Cont'd.

	I	II	III	IV	V	V
Willow Creek Res.	3.5(56)	6.2(56)	9.1(45)	11.1(14)		
Rock Creek Sec. I	3.0(166)	6.9(133)	11.0(74)	14.1(42)		
Rock Creek Sec. II	3.0(47)	6.6(41)	10.2(21)	13.4(8)		
Tongue River	8.8(15)					
<u>Cutthroat Trout</u>						
Holiday Lake (1954-58)	3.1(13)	10.0(13)	14.2(2)	15.1(1)		
Miller Creek	2.8(53)	5.5(33)	7.3(4)			
Foster Creek	3.7(26)	5.6(15)	8.4(4)	9.5(1)		
Webb Lake	3.3(31)	7.6(31)	10.0(16)	13.5(7)		
Parker Lake	3.0(58)	6.7(57)	10.2(39)	12.7(11)	17.2(1)	
Upper Elliot	2.7(49)	4.9(49)	6.6(25)	8.8(2)		
Ranch Creek	3.4(60)	5.8(40)	8.2(16)	10.8(2)		
Lower Elliot	2.8(23)	5.1(23)	6.8(16)	8.5(3)		
Rock Cr. Sec. I	2.7(72)	5.7(70)	8.9(30)	12.6(2)	15.7(1)	
Rock Cr. Sec. II	2.9(32)	5.8(28)	7.8(6)	11.8(1)		
Little Blackfoot Sec. 9-7	3.1(102)	5.0(41)	6.9(5)			
<u>Dolly Varden</u>						
Ranch Creek	2.6(12)	4.9(12)	7.8(6)	13.1(2)		
Rock Creek Sec. I	4.1(23)	7.3(23)	10.7(17)	14.7(3)		
Rock Creek Sec. II	3.5(31)	6.1(17)	9.2(9)	13.6(3)	16.6(1)	
<u>Rainbow & Cutthroat Hybrids</u>						
Holiday (1954-58)	3.6(25)	9.5(25)	14.0(4)	16.1(1)		
<u>Brown Trout</u>						
Rock Creek Sec. I	4.3(115)	9.9(93)	13.0(43)	15.6(16)	17.1(4)	17.9(1)
Little Blackfoot Sec. 1-8	3.6(99)	7.9(31)	10.5(14)	12.7(1)		
Little Blackfoot Sec. 9-17	2.8(117)	5.7(91)	8.7(39)	11.0(16)	12.8(1)	
<u>Walleye</u>						
Westrope Lake	4.3(45)	9.1(45)	13.4(45)	15.4(45)		
<u>Lake Trout</u>						
Twin Lake	2.8(15)	5.8(15)	10.4(12)	13.9(5)	19.9(2)	25.2(1)
<u>Greyling</u>						
Mussigbrod	3.5(9)	8.0(8)	10.3(8)			

Table I - Cont'd

Whitefish

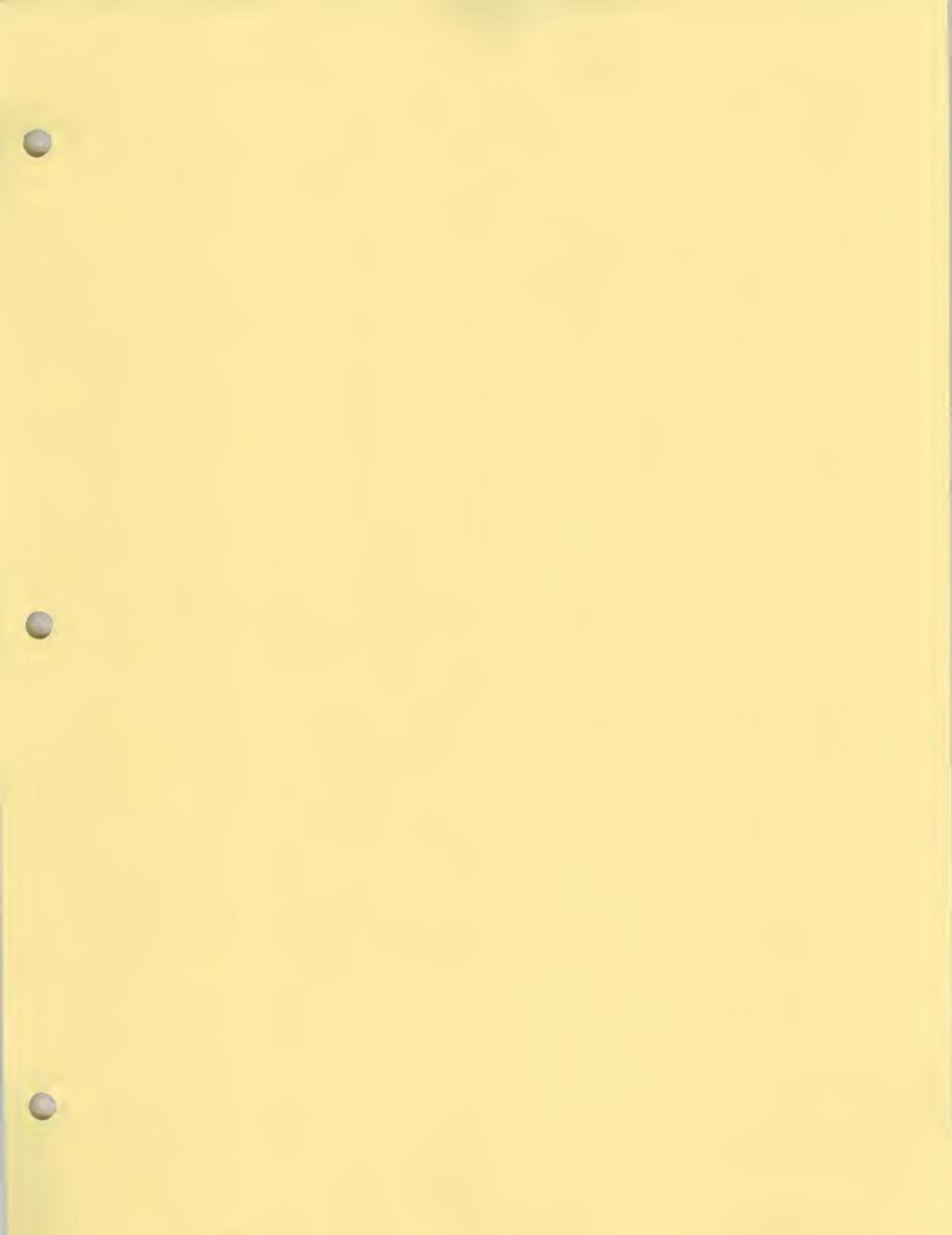
	I	II	III	IV	V	VI	VII
Steel Creek	3.1(45)	6.7(43)	9.6(31)	11.5(20)	13.2(12)	14.8(4)	15.4(2)
Big Hole (lower)	4.4(19)	8.9(19)	11.1(14)	12.9(2)			
Rock Creek Sec. I	3.7(101)	7.3(76)	9.9(34)	12.3(14)	14.2(6)	17.1(1)	19.0(1)
Rock Creek Sec. II	2.5(13)	5.6(13)	8.1(13)	10.3(5)	11.2(5)	12.4(1)	
Rock Creek Sec. I 1960	3.7(46)	7.8(22)	9.4(22)	10.7(7)	11.9(2)		
Little Blackfoot R. Sec. 4-8	3.1(67)	6.3(36)	8.6(20)	10.0(12)	11.0(10)	12.3(2)	14.4(1)
Little Blackfoot R. Sec. 9-17	2.3(151)	5.1(63)	8.0(94)	9.7(75)	10.9(59)	11.5(22)	13.1(3)



Table II - Summary of Bottom Samples Collected In The
 Madison River On August 24-25, 1959. Ten One Square Foot
 Samples Were Collected On A Transect Across The Stream At
 Each Station.

Location Of Sample	Diptera	Trichoptera	Plecoptera	Ephemeroptera	Coleoptera	Lepidoptera	Polychaeta	Turbellaria	Hirudinea	Malacostraca	Gastropoda	Acarai	Cottus
Hutchins Bridge	90	92	29	161	111	-	2	-	-	-	-	3	-
Sheldon Bridge	488	6	27	20	3	-	-	-	-	-	-	-	1
Varney Bridge	516	360	32	112	30	-	1	-	-	-	-	1	1
Below Meadow Lake	286	531	2	293	16	19	-	-	2	125	195	-	-
R.R. Bridge at Three Forks	73	313	7	17	60	1	-	58	-	-	1	-	-







MONTANA DEPARTMENT OF FISH AND GAME
FEDERAL AID IN FISH RESTORATION SECTION
HELENA, MONTANA

JOB COMPLETION REPORT
INVESTIGATIONS PROJECTS

State of Montana

Project No. F-23-R-2

Name Fisheries Investigations Laboratory

Job No. I, II, & III

Title Age and Growth, Bottom Sample
and Miscellaneous Studies

Period Covered May 1, 1958 to April 30, 1959

Abstract:

Age-growth studies were made on about 2,600 specimens. Bottom samples analyzed were 85 sq. ft. samples and 16 sq. yard samples. Files on past age-growth data were reorganized and progress was made on summarization of past age-growth studies.

Objectives:

Age-growth data are used extensively by field biologists in managing the various waters. Bottom samples provide additional biological data to fish managers when problems arise in polluted or potentially polluted waters. These time consuming jobs are preformed at the laboratory using standard procedures to facilitate comparisons. Past age-growth data would be reviewed and compiled in tabular form.

Techniques and Findings:

Age and growth determinations were made on approximately 2,600 specimens. A summary of part of these is presented in Table I. In addition to these, growth studies were made on small collections from mountain lakes.

The files on past age-growth studies were reorganized and exact locations to collections established. Some progress was made in summarization of data by species. The approximate number of specimens and collections (at least 10 fish per collection) for some of the major samples available for comparison are presented in Table II. In addition to these, age-growth data are available for at least 16 other species of fish.

Table I - Summary of some age-growth determination made during 1959.

Location	Sp.	Mean calculated total length (inches) at each annulus							
		I	II	III	IV	V	VI	VII	VIII
Wolf Creek	Eb	3.0(32)	5.8(18)	8.6(3)					
Big Sandy Creek	Eb	2.7(9)	4.9(7)	7.1(2)	8.5(1)				
Eagle Creek	Eb	3.5(22)	6.2(8)	9.2(1)	11.0(1)				
Silver Lake	Eb	2.4(55)	5.5(55)	7.8(24)					
Georgetown Lake	Eb	4.0(12)	9.9(12)	14.6(3)					
Moore Lake	Eb	3.7(46)	7.3(27)	9.8(4)					
Big Sandy Creek	Rb	2.7(47)	5.1(26)	7.1(16)					
Eagle Creek	Rb	3.1(11)	6.5(27)	7.6(27)					
Duck Lake	Rb	5.3(26)	16.8(26)	22.0(26)	25.5(1)				
Tiber Res.	Rb	8.7(50)	11.5(23)						
Canyon Ferry	Rb	3.4(13)	7.2(12)	13.8(10)	17.1(1)	19.0(1)			
East Boulder R.	Rb	2.3(22)	4.8(18)	7.0(14)	9.7(3)				
Georgetown Lake	Rb	6.1(24)	13.5(23)	15.9(1)					
Storm Lake	Rb	4.4(15)	7.4(9)	11.8(9)	15.1(5)				
Rock Cr. (Sec.1)	Rb	2.8(17)	6.9(10)	11.0(78)	13.7(36)	16.1(6)	17.0(2)		
Rock Cr. (Sec.2)	Rb	2.7(18)	6.5(13)	10.1(66)	12.6(19)	15.6(3)			
Mystic Lake	Rb	2.5(20)	6.0(20)	9.4(13)	11.2(9)	11.7(1)			
Crystal Lake	Rb	2.9(10)	6.1(7)	8.6(3)	11.0(3)	12.8(1)			
Lyon Lake	Rb	2.9(11)	7.3(8)	10.7(1)					
Racetrack Lake	Rb	2.7(20)	6.6(19)	10.2(5)	12.7(3)	14.1(1)			
Canyon Ferry Res.	LL	4.2(67)	10.4(67)	14.3(35)	17.2(34)	20.7(9)	23.6(3)		
East Boulder R.	LL	3.3(56)	6.7(27)	9.5(11)	13.2(4)	17.2(1)	19.2(1)	20.7(1)	
West Boulder R.	LL	2.6(65)	5.7(28)	8.9(12)	12.6(3)	16.1(2)			
Rock Creek(Sec.1)	LL	3.5(31)	8.5(21)	12.9(9)					
Georgetown Lake	Ct.	3.9(121)	9.4(19)	13.6(47)	16.7(15)	21.3(1)			
Rock Creek(Sec.1)	Ct.	2.7(78)	6.3(72)	9.7(23)	12.4(11)	15.4(2)			
Rock Creek(Sec.2)	Ct.	2.7(60)	6.5(58)	10.2(14)	14.1(1)				
Lower Twin Lake	Ct.	2.4(32)	4.8(32)	7.0(32)	11.3(3)	14.4(1)			
Fisher Lake	Ct.	3.1(13)	6.4(13)	9.3(8)	11.0(4)				

* The number of specimens averaged is in parenthesis.

Table I cont. - Summary of some age-growth determination made during 1959.

Location	Sp.	Mean calculated total length (inches) at each annulus							
		I	II	III	IV	V	VI	VII	VIII
Clarks Fork River	Wf	4.4(54)	8.3(26)	10.9(18)	12.3(12)				
Canyon Ferry	Wf	5.2(10)	8.2(6)	9.9(4)	11.8(3)	13.5(3)			
Como Lake	Wf	3.7(21)	7.9(21)	10.2(10)	11.9(4)	13.6(1)			
Chancey Flynn Res.	NP	9.8(23)	15.3(23)	18.2(19)					
Frenchman Res.	WE	7.3(34)	13.3(28)	15.8(9)	18.1(4)	17.7(1)			
Fort Peck Res.	Saug.	5.1(22)	8.5(22)	11.8(21)	12.9(6)	14.7(4)	17.9(1)		
Georgetown Lake	Gr	3.4(32)	9.4(27)	13.0(16)					
Georgetown Lake	SS	3.6(8)	8.7(8)	13.3(3)	17.5(2)				
Rock Creek(Sec.1)	Dv	3.4(35)	6.7(35)	9.6(32)	12.9(5)				
Upper Whitefish L.	Dv	2.9(17)	5.8(17)	8.5(17)	10.7(11)	14.3(2)	16.3(1)		
Mid Thompson Lake	KOK	4.2(37)	8.4(17)	10.6(11)					
Tiber Res.	C Su	3.0(67)	9.7(32)						
Canyon Ferry Res.	C Su	1.9(112)	5.2(108)	8.5(100)	10.8(81)	12.9(42)	14.3(6)	14.9(5)	16.4(3)
Canyon Ferry Res.	F Su	2.3(16)	5.7(12)	8.9(33)	10.4(19)	10.7(2)			
Canyon Ferry Res.	YP	2.5(88)	5.2(88)	7.1(67)	8.7(39)	10.8(7)	12.4(3)		
Dailey Lake	YP	2.1(65)	4.7(58)	7.1(30)	8.8(28)	10.1(1)			
East Boulder River	RbxCt	2.3(15)	4.5(14)	6.5(10)	8.5(5)	10.9(1)			
Clarks Fork River	C Su (Col.)	1.8(123)	3.3(82)	5.6(54)	7.4(43)	10.4(39)	12.7(26)	15.5(21)	16.8(9)
Thompson Falls Res.	C Su (Col.)	1.7(82)	3.3(63)	5.1(39)	7.3(30)	10.1(29)	13.3(18)	15.9(16)	17.0(3)
Clarks Fork River	CRC	2.4(36)	4.6(22)	6.1(6)	8.4(3)				
Clarks Fork River	SQ	1.8(78)	3.4(58)	5.0(38)	6.7(19)	8.4(14)	9.9(11)	11.5(8)	12.8(4)
Thompson Falls Res.	SQ	1.6(28)	3.2(22)	4.6(15)	6.5(3)	8.3(2)	9.9(2)	11.8(1)	13.0(1)

Table II - The major collections and number of specimens on which age-growth determinations have been made.

Species	Number of Collections	Number of Specimens
Rainbow trout	108	6,600
Cutthroat trout	78	3,000
Brook trout	50	3,200
Brown trout	52	3,600
Whitefish	41	2,000
Yellow perch	32	1,900

The work completed on bottom samples was as follows:

- A. Sheep Creek - 25 sq. ft. samples.
- B. Deep Creek - 16 sq. yard samples.
- C. Boulder River - 60 sq. ft. samples

Samples A and B are included in the completion report for the DDT study (F-21-R). The samples for the Boulder River were collected in anticipation of a Forest spray program in this area for 1959 and are reported in Project F-9-R-7.

Miscellaneous work completed or in progress includes the following:

1. Analysis of 375 trout stomach samples from Flint Creek (in progress).
2. Stomach samples analyzed from the Clarks Fork Columbia River were 25 whitefish, 20 Columbia River chubs, 21 squawfish and 26 coarse-scale suckers.
3. Supplying chemicals, preservatives and supplies and liaison with the various departments of the college for field personnel.

Recommendations:

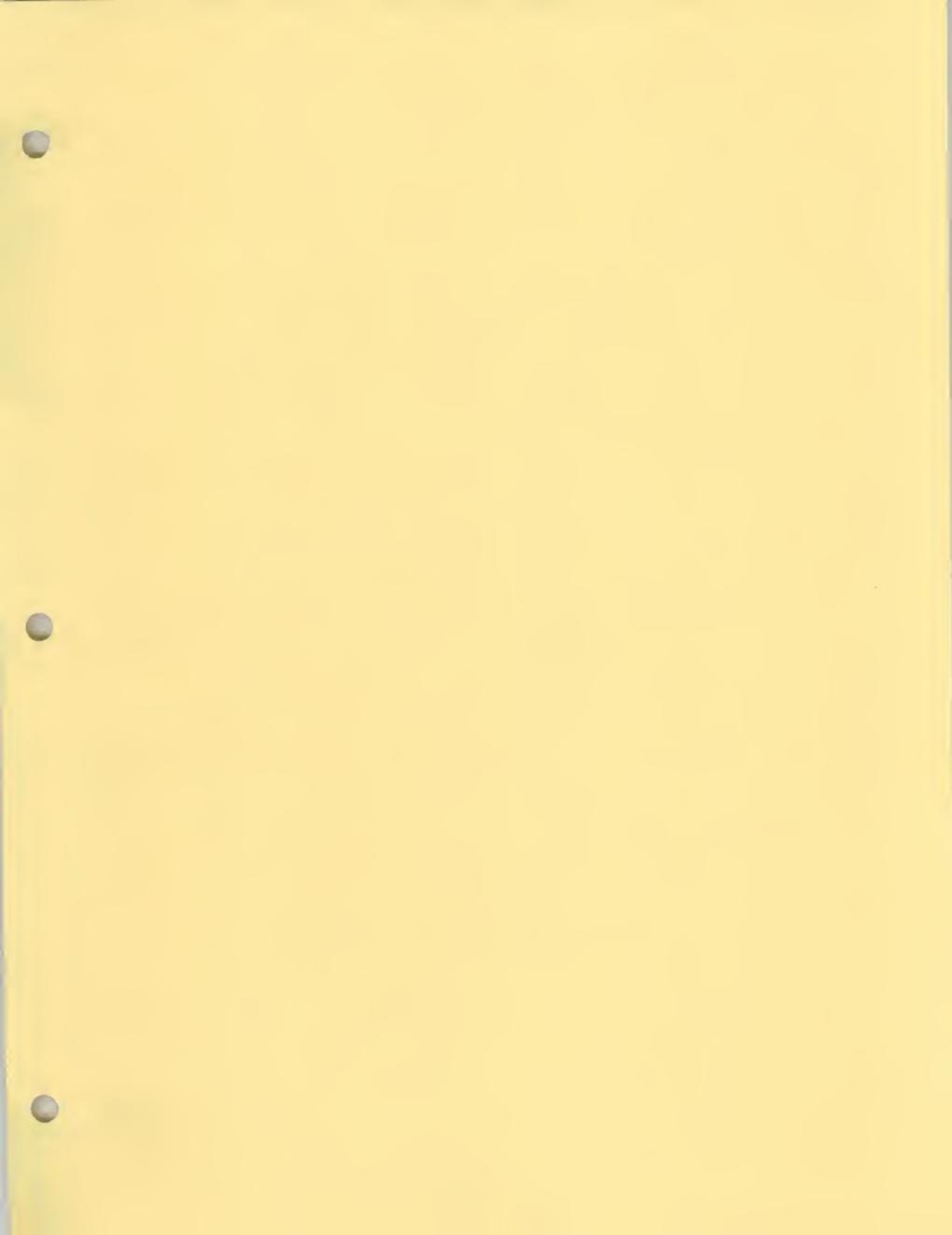
Laboratory work on age-growth and bottom sample analysis should be limited to specific and justifiable management needs of field biologists. The summary and tabulation of past age-growth data should continue to facilitate comparison of information.

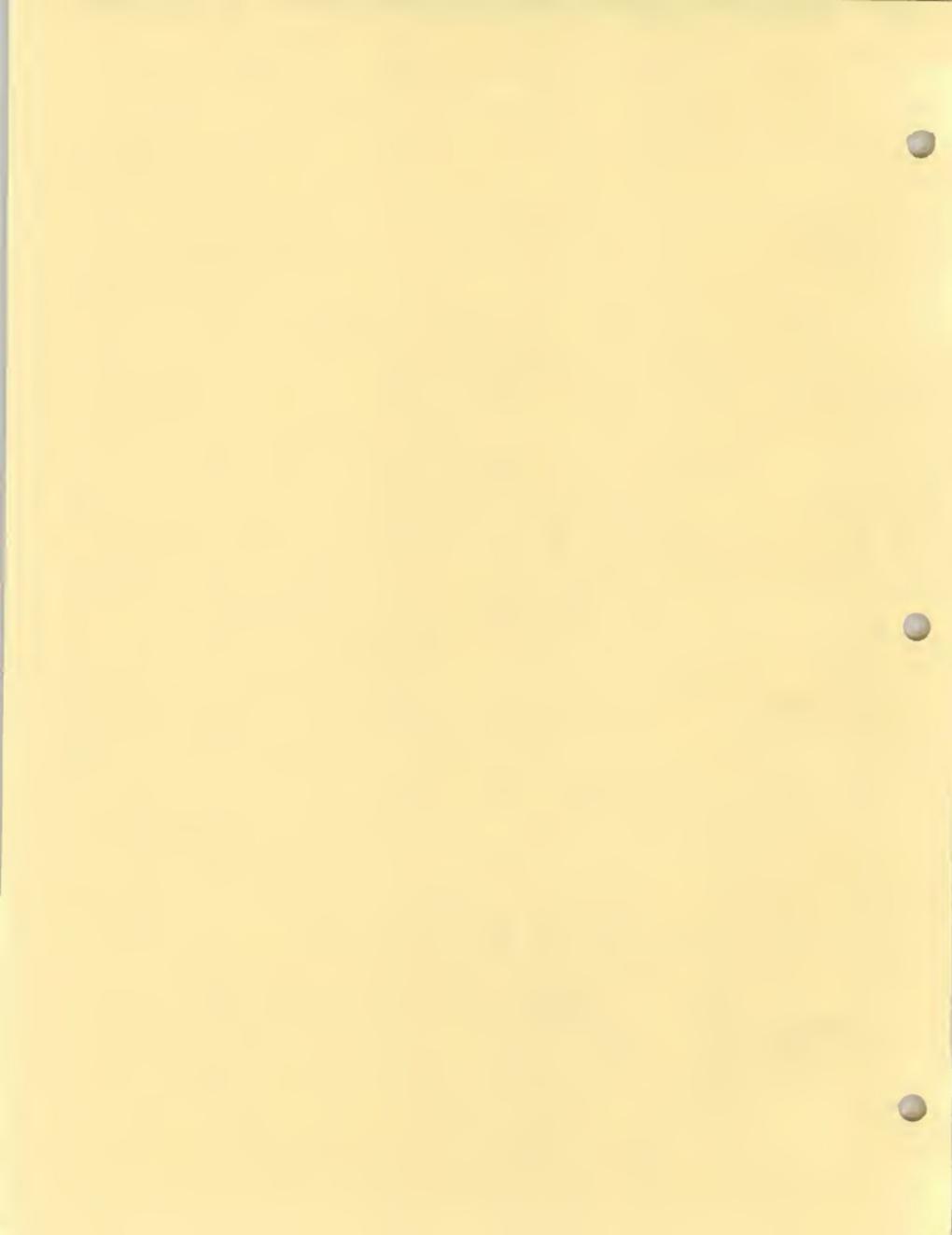
Data and Reports:

The original data are with the project leader at Montana State College, Bozeman.

Prepared by Richard Graham
Date May 13, 1959

Approved by George D. Holton





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JOB COMPLETION REPORT

INVESTIGATIONS PROJECTS ✓

State of Montana

Project No.: F-23-R-1

Name: Fisheries Investigations Laboratory

Job No. I & II

Title: Age-growth Studies and Bottom Sample Analysis

Period Covered: May 1, 1957 to April 30, 1958

Abstract:

Age-growth studies were made on about 2,000 specimens. Bottom samples analyzed were 35 sq. ft. samples and 48 sq. yd. samples. Considerable time was spent revising files on past age-growth data.

Objectives:

Age-growth data are used extensively by field biologists in managing the various waters. Bottom samples provide additional biological data to fish managers when problems arise from polluted or potentially polluted waters. The laboratory performs these time consuming jobs using standard procedures to facilitate comparisons. Past age-growth data would be reviewed and compiled in tabular form.

Techniques & Findings:

Age and growth determinations were made on approximately 2,000 specimens. A summary of part of these is presented in Table 1. In addition to these, growth studies were made on 300 Columbia River chub and 267 squawfish and are reported in Project F-12-R-4. A total of 250 scales from the Clearwater Lakes are a part of a continuing study and will be reported in the combined summary of that study. Work done on bottom samples includes the following:

- A. Sheep Creek - 25 sq. ft. samples.
- B. Musselshell River - 10 sq. ft. samples.
- C. Judith River - 9 sq. yard samples.
- D. Madison River - 28 sq. yard samples.
- E. Madison River - 9 5-minute drift samples.
- F. Belt Creek - 11 sq. yard samples.

The data for samples A, B, C, D and E are included in the completion reports for the DDT study (F-21-R). The information from Belt Creek relates to mine pollution and the analyses were sent to the fish manager. Sometime was spent assisting in the analysis of

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Table 1. Summary of some age-growth determinations made during 1958.

Location	Species	No.	Mean calculated total length (inches) at each annulus							
			I	II	III	IV	V	VI	VII	VIII
Beaver Creek	Rb	15	2.9(15)	5.7(15)	8.9(5)					
Clear Creek	Rb	33	2.9(35)	5.2(27)	6.8(10)					
Little Theriault L.	Rb	9	3.9(9)	7.7(5)	12.8(3)	15.1(1)				
Racetrack Lake	Rb	11	2.5(11)	6.4(11)	9.9(10)	12.2(5)				
Beaver Creek	Eb	30	3.1(30)	5.4(19)	8.9(5)	11.4(2)				
Clear Creek	Eb	107	3.3(107)	5.9(45)	8.1(9)					
Cedar Creek	Wf	47	4.0(47)	7.6(28)	10.2(19)	12.2(10)	13.5(3)			
Trout Creek	Wf	18	3.6(18)	5.9(4)						
Little Blackfoot R.	Wf	10	3.1(10)	6.5(10)	8.7(6)	10.7(1)				
Clearwater R. 1957	Wf	55	3.8(55)	6.6(31)	8.3(21)	9.6(12)	10.4(3)			
Little Blackfoot R.	LL	66	3.2(66)	6.9(33)	10.1(11)	12.6(2)				
Little Blackfoot R.	LL	72	2.8(72)	6.1(44)	8.8(21)	11.0(3)				
Trout Creek	Dv	17	2.8(17)	5.8(12)	9.0(1)					
Frozen Lake	Dv	41	2.4(41)	5.3(41)	8.4(37)	11.5(15)	14.1(11)	16.8(1)		
Clearwater River	Dv	39	2.4(31)	4.7(23)	7.0(9)	9.8(1)	11.5(1)	14.4(1)	16.7(1)	
Mussigbred Lake	Gr	43	3.7(43)	7.9(32)	10.0(12)	10.9(2)	12.3(1)			
Rainbow Lake	YP	24	1.8(24)	4.2(24)	6.3(24)	7.5(23)	8.4(22)	8.9(16)	9.7(2)	10.3(1)
Rainbow Lake	W.E.	14	4.3(14)	9.3(14)	13.5(13)	16.3(13)	18.7(13)	20.4(11)	21.9(4)	
Cooper Lake	FSu	49	1.5(49)	3.5(49)	6.3(49)	9.3(49)	11.8(32)	14.0(23)	15.8(12)	17.1(5)

Table 1. Summary of some age-growth determinations made during 1958.

Location	Species	No.	Mean calculated total length (inches) at each annulus				
			2.3(46)	4.5(45)	6.3(36)	7.6(19)	
Weasel Lake	Ct	46	2.3(46)	4.5(45)	6.3(36)	7.6(19)	
Middle Wolverine L.	Ct	17	2.4(17)	5.3(17)	7.6(17)	9.1(7)	10.4(1)
Lower Wolverine L.	Ct	9	2.6 (9)	5.3(9)	7.7(9)	10.0(3)	
Theriault Lake	Ct	30	2.3(30)	4.7(26)	7.0(22)	9.2(16)	10.9(10)12.4(3)
Heskin Lake	Ct	20	2.0(20)	6.5(20)	10.6(20)	13.7(2)	14.5(1)
Dry Creek	Ct	33	3.4(33)	5.8(5)	8.2(1)		
Cedar Creek	Ct	21	3.3(21)	5.9(7)	6.6(1)		
Trout Creek	Ct	42	2.7(42)	5.8(14)			
Medicine Lake	Ct	40	3.0(40)	6.3(35)	10.2(13)	12.4(3)	
Little Blackfoot R.	Ct	38	3.0(38)	5.4(19)	7.2(2)		
Clearwater River	Ct	41	2.6(41)	4.6(25)	6.8(6)		

bottom and vegetation samples from the Three Forks ponds. These are reported in Job II, F-9-R-6.

Miscellaneous work done or in progress at the laboratory include:

1. Turbidity readings on 250 water samples from Belt Creek. (completed).
2. Analysis of 250 trout stomach samples from Flint Creek (in progress).
3. Supplying chemicals, preservatives and supplies and liaison with various departments of the college for field personnel.
4. Considerable time was spent revising files of past age-growth data.

Recommendations: Laboratory work on age-growth and bottom sample analysis should be limited to specific and justifiable management needs of field biologists. The summary and tabulation of past age-growth data should continue to facilitate comparison of information. Future scale mountings should be made in plastic to save time and expense.

Prepared by Richard J. Graham

DATE _____

Approved by George D. Holton

and the first time I have ever seen a black bear. I was in the woods near the cabin and I heard a noise like a dog barking. I looked around and saw a black bear walking towards me. It was about 10 feet away. I was scared but I didn't want to run because I heard that running can make you look like prey. So I just stood there and the bear walked away. I was so scared but also so excited. I have never seen a bear before. I will never forget this experience.

